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REPORT ON THE WATER QUALITY OF LONG ISLAND SOUND

Environmental Protection Agency
Boston, Massachusetts

March 1971

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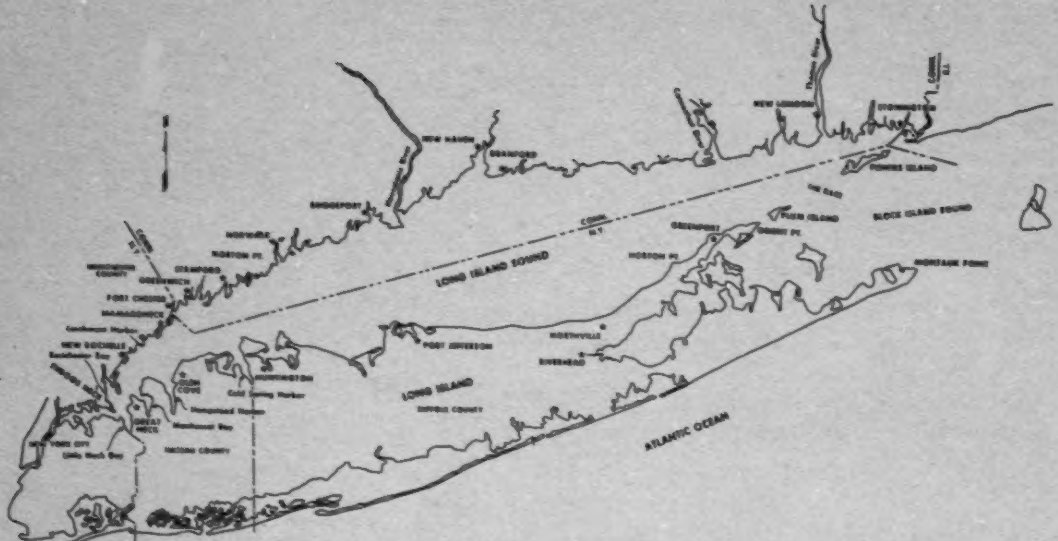
Report on the Water Quality of Long Island Sound

March 1971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PLUM ISLAND
BLOCK ISLAND SOUND
NORWALK
CONN.
N.Y.
GREENPORT
ORIENT PT.
NOROTON PT.
HORTON PT.
MONTAUK POINT
WESTCHESTER COUNTY
STAMFORD
GREENWICH
LONG ISLAND SOUND
PORT CHESTER
MAMARONECK
Larchmont Harbor
NORTHVILLE
NEW ROCHELLE
PORT JEFFERSON
Eastchester Bay
RIVERHEAD
GLEN COVE
HUNTINGTON
Cold Spring Harbor
LONG ISLAND
SUFFOLK COUNTY
Hempstead Harbor
GREAT NECK
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ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE • NORTHEAST REGION

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for

Report on the Water Quality of

Long Island Sound

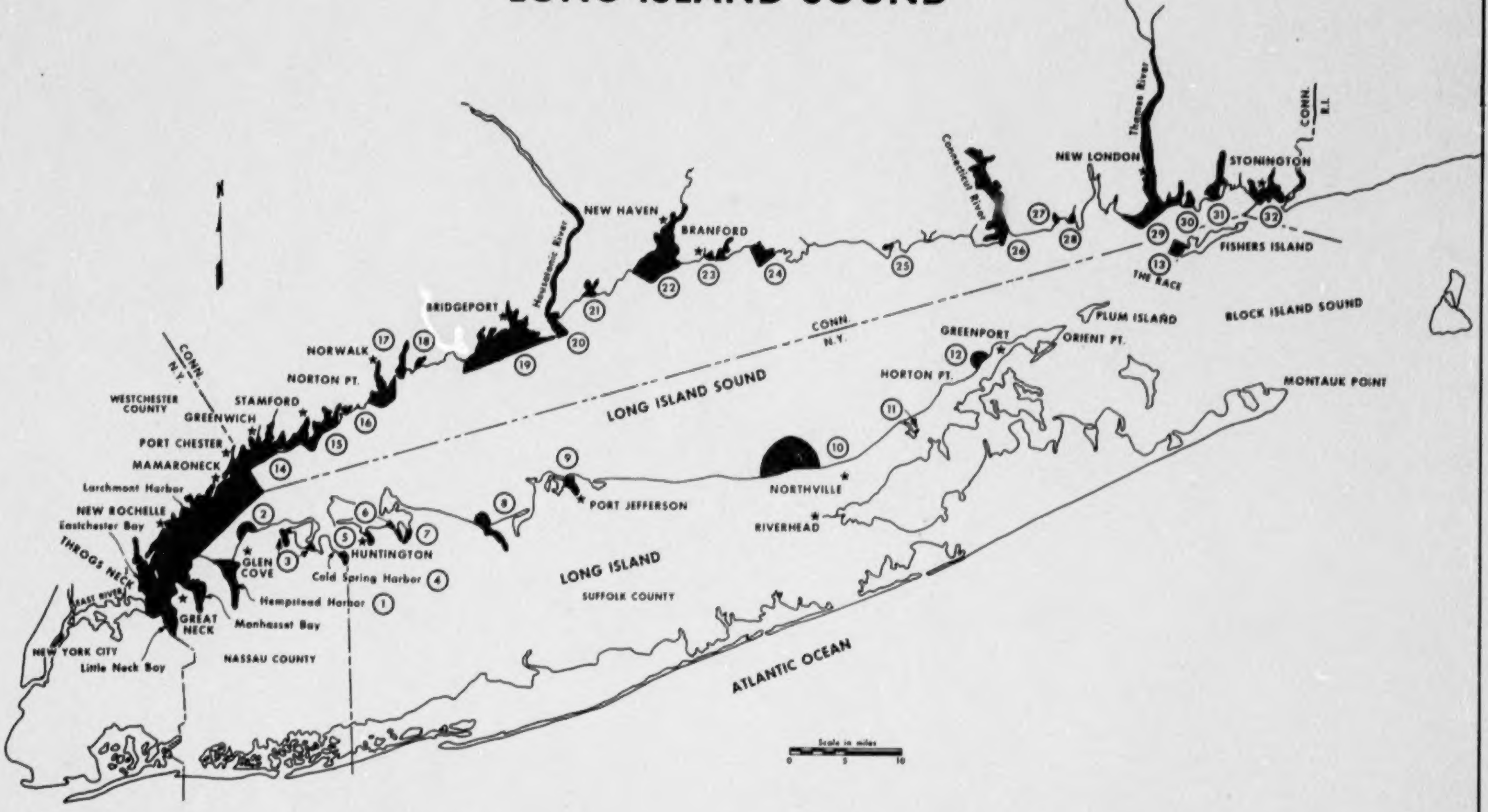
March, 1971

Page, Figure or Section Number	Correction
Section II, Page 10	Closed Shellfish Areas listed are numbered as follows: In New York 1. Hempstead Harbor 2. Vicinity of Matinicock Harbor 3. Oyster Bay Harbor (part) 4. Cold Spring Harbor (part) 5. Huntington Harbor (part) 6. Centerport Harbor (part) 7. Northport Harbor 8. Nissequoque River 9. Port Jefferson Harbor (part) 10. Offshore area of Northville (oil unloading facility) 11. Vicinity of Mattituck Inlet 12. Vicinity of Inlet Point (Greenport sewer outfall) 13. Vicinity of west end of Fishers Island In Connecticut 14. Greenwich 15. Darien - Stamford 16. Darien - Norwalk 17. Norwalk 18. Westport - Fairfield 19. Bridgeport 20. Stratford - Milford (Housatonic River)

Page, Figure or Section Number	Correction
	21. Milford
	22. New Haven
	23. East Haven - Branford
	24. Thimbles Islands
	25. Madison - Clinton
	26. Old Saybrook - Old Lyme (Connecticut River)
	27. Four Mile River
	28. Bride Brook
	29. Groton - New London (Thames River)
	30. Groton - Mumford Cove
	31. Groton - Mystic River
	32. Stonington
Figure 3	Replace Figure 3 with the attached new Figure 3 showing numbered location of closed shellfish areas.
Section III, Page 13	Second paragraph, revise fifth sentence to read: "Of the 60 systems listed, five in Connecticut serving less than one percent of the sewered population are individual septic tank communities; 32 (12 in New York and 21 in Connecticut) serving 73 percent provide primary treatment; and 23 (10 in New York and 13 in Connecticut) serving 27 percent provide secondary treatment".
Section III, Page 16	Second paragraph, sixth line - replace "Port Jefferson" with "Northport".
Section IV, Table 6	Seventh entry in this Table, change "Manyasset" to "Manhasset".
Section V, Page 32	Third paragraph - replace last sentence with "The municipal plants that have been identified total 38, of which six are on schedule; 24 are behind schedule; one has a pending completion date (with no interim date) and six presently provide adequate treatment with no established schedule".

Page, Figure or Section Number	Correction
Appendix B, Table B-1	Change entry No. 30, "Fairfield" as follows: a) Under "Degree of Treatment", replace "Primary" with "Secondary". b) Under "Federally Approved Implementation Schedule" delete all dates of the schedule and code regarding status.
Appendix B, Table B-1	Change footnotes at the end of page 3 of Table B-1 as follows: a) Under the column "Status", a "1" indicates the step has been completed, a blank indicates it has not been completed. Status of Compliance is as of March 15, 1971 for Connecticut sources and October 30, 1970 for New York sources. b) An asterisk "*" at the right margin of the Implementation Schedule indicates it is a State Schedule with no Federal Schedule established.

CLOSED SHELLFISH AREAS
LONG ISLAND SOUND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Larchmont Harbor
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Eastchester Bay
THROGS NECK
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SUFFOLK COUNTY
ATLANTIC OCEAN
Scale in miles
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REPORT ON THE
WATER QUALITY OF LONG ISLAND SOUND

MARCH 1971

ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE - NORTHEAST REGION

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A - Conventional Steam and Nuclear Electric Power Plants on Long Island Sound.

B - Wast Source Listing and Implementation Plan Schedule.

C - Letter dated February 10, 1971, Long Island Oyster Farms, Inc., New Haven, Connecticut regarding economic loss to shellfish industry as a result of water pollution.

Letter dated February 11, 1971, State of Connecticut Shell Fish Commission, Milford, Connecticut regarding economic loss to shellfish industry as a result of water pollution.

D - Water Quality Standards.

E - Environmental Protection Agency Survey of Long Island Sound - September-October 1969.

F - Environmental Protection Agency Survey of North Shore of Long Island Sound - July 1970.

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REPORT ON THE WATER QUALITY OF LONG ISLAND SOUND

CONCLUSIONS

1. Long Island Sound is a valuable natural resource which the present generation holds in trust for posterity, with an obligation to pass it on in the best possible condition.

2. Pollution of Long Island Sound, particularly in its harbors and embayments, has adverse effects on fish, shellfish, and other aquatic life; causes interference with recreational use of the waters; despoils beaches and shore-front property; and causes interference with aesthetic enjoyment. Dredging and filling of marshlands also significantly affect the ecology of the Sound. The sources of this pollution include wastes from municipalities and industries (including oil and heated effluents), Federal activities, watercraft, and sewer overflows.

3. Many commercial shellfish areas in New York and Connecticut are closed to the harvesting of shellfish for direct human consumption or market purposes as a result of high bacterial levels or proximity to sources of pollution. It is estimated that losses to the shellfish industry over the past 50 years have exceeded $500 million as a result of these closures.

4. Water quality standards have been established to preserve and protect the waters of Long Island Sound. Recent reports and surveys show that water quality in areas of Long Island Sound, particularly in the major harbors and embayments, does not meet Federal-State water quality criteria. Moreover, many of the Federally approved water quality standards implementation schedules are not being met.

5. A primary source of bacteria in water is the discharge of raw and inadequately treated domestic wastes. Evidence of severe bacterial pollution, in violation of the water quality standards, has been found by Environmental Protection Agency (EPA) in the East River, Off Stepping Stones, Off Hewlett Point, Eastchester Bay, Hutchinson River, Little Neck Bay, Manhasset Bay, Off Peningo Neck, Port Chester Harbor, Greenwich Harbor, Stamford Harbor, Bridgeport Harbor, Housatonic River, New Haven Harbor, New London Harbor and Thames River.

6. The small quantity of oxygen normally dissolved in water is perhaps the most important single ingredient necessary for a healthful, balanced, aquatic life environment. The discharge of inadequately treated municipal and industrial wastes with their high concentrations of biochemical oxygen demand has resulted in seriously low levels of dissolved oxygen in violation of the Federal-State standards in many areas of the Sound. EPA studies show that these areas are: East River, Off Stepping Stones, Off Hewlett Point, Eastchester Bay,

Hutchinson River, Norwalk Harbor, Housatonic River, Milford Harbor, New Haven Harbor and Thames River. At present, the main body of Long Island Sound has not evidenced signs of oxygen deficiency.

7. Many of the harbors and embayments of Long Island Sound have high nutrient levels. Algal blooms have occurred in Long Island Sound, with the most recent occurring outside New Haven Harbor in the fall of 1969.

8. Vessels of all types, commercial, recreational, and Federal, plying the waters of Long Island Sound and its tributaries are contributors of untreated and inadequately treated wastes in local harbors and in the open waters of the Sound. These discharges intensify local problems of bacterial pollution.

9. Oil discharges from industrial plants and commercial ships and careless loading and unloading of cargos, despoil beaches and other recreational areas, damage shore-front property, coat the hulls of pleasure boats, and are deleterious to fish and other aquatic life.

10. Disposal of polluted dredged material in the open waters of Long Island Sound contributes to degradation of water quality in the Sound.

11. The circulation pattern of Long Island Sound is such that the wastes discharged in Connecticut cross the State line into New York. In the western part of the Sound, wastes discharged in New York cross the State line into Connecticut.

12. Discharges of sewage, industrial wastes, and other wastes originating in New York and Connecticut cause pollution of Long Island Sound which endangers the health or welfare of persons in States other than those in which such discharges originate. This pollution is subject to abatement under the provisions of the Federal Water Pollution Control Act (33 U.S.C. 1151 et seq.).

RECOMMENDATIONS

It is recommended that:

1. Enforcement action be initiated immediately against those sources of pollution not in compliance with Federally approved water quality standards.

2. Waste treatment be provided by all municipal and industrial waste sources affecting Long Island Sound so as to provide compliance with Federally approved water quality criteria established by the States.

3. All municipal and industrial discharges containing fecal coliform bacteria be effectively disinfected year-round.

4. Where Federally approved water quality standards implementation schedules do not contain interim dates for submission of final plans and specifications and for start of construction, such dates be furnished by the States to the Conference Chairman within 30 days from the date of this conference. In all such cases, the established dates for completion of construction, as specified in the Federally approved State water quality standards shall continue to apply.

5. There are 46 municipal and industrial waste sources in the conference area not included in the Federally approved water quality standards implementation schedules. These sources and the State Schedules are listed in Tables B-1 and B-3 contained in this report. It is recommended that these schedules be adopted by the conferees as the enforceable conference implementation schedules.

6. The Environmental Protection Agency, the States, and the Interstate agencies develop a water quality management program for Long Island Sound. The program shall evaluate alternatives and recommend specific programs, including financial and organizational arrangements, to secure long-term compliance with the water quality standards and a rational management scheme to protect the Sound. The program shall include, but not be limited to:

   a. Determination of areas of critical value for recreation and for finfish and shellfish production, and of measures for restoring these areas or protecting them from future encroachments;

   b. Alternate municipal and industrial waste collection and treatment systems;

   c. Location, siting, and design of power plants;

   d. Disposal of dredged material, sludge, and other wastes;

e. Financial, organizational, and legal arrangements for implementing recommended actions.

It is recommended that the program be initiated immediately. It should be coordinated with the interagency multipurpose plan for the Water and Related Land Resources of Long Island Sound being initiated under the leadership of the New England River Basins Commission. None of these activities shall be construed as superseding the existing water quality standards implementation schedules or the recommendations of the Long Island Sound Enforcement Conference.

7. The practice of transporting polluted dredged material to spoil areas in the open waters of Long Island Sound be prohibited.

8. A comprehensive study of the combined sewers in the area be conducted by Connecticut and New York to determine methods of elimination or treatment, and the report of this study be completed by April 1973. Upon completion of this study, the conferees shall establish a program and schedules for alleviating this source of pollution.

9. Connecticut is to take the appropriate steps to require marinas to install facilities to receive the sewage discharge from vessels for appropriate on-shore treatment.

I - BASIN CHARACTERISTICS

Outline of Area

This report is concerned with the waters of Long Island Sound and its tidal estuaries, bays and harbors to head of tide along the shores of New York and Connecticut between Throgs Neck Bridge in the west and a line extending from the New York-Connecticut-Rhode Island State line to north shore of Long Island Sound at Orient Point in the east (see Figure 1). The area covered includes Fishers Island and Plum Island. It excludes the Pawcatuck River Basin and the tidal portion of the Connecticut River not affecting Long Island Sound.

Geology

Long Island Sound was formed in the Tertiary period, probably as the valley of a large stream, by the erosion of weathered bedrock and the overlying Lloyd sand. South of the Sound, a line of hills was formed on what is now Long Island. After the ice sheets melted, the northern slopes of these hills were carved into a series of short steep straight valleys and wide deep harbors by the numerous small northward flowing streams. These small streams on the north shore of Long Island have drainage areas of less than 30 square miles.

Long Island Sound has a length of more than 90 nautical miles and an average width of about ten nautical miles. The maximum width of about 20 nautical miles occurs opposite New Haven Harbor. The depths of the near-shore waters (less than a mile off shore) are generally below 25 feet. Off-shore waters range in depth from 25 to more than 100 feet with some pockets having depths of 125 to 150 feet. The volume of the Sound is estimated to be about 2,200 billion cubic feet (63 billion cubic meters).

Long Island Sound has an eastern entrance to the Atlantic Ocean through Block Island Sound and The Race. The Race is that stretch of water between Fishers Island and Plum Island. The western entrance to the Sound is by way of the East River at Throgs Neck.

Climate

The average annual air temperature of Long Island Sound is about 51°F. The average monthly air temperature ranges from the middle seventies in the summer to the middle twenties in winter. Extreme temperatures range from above 100°F to less than zero.

Precipitation is evenly distributed throughout the year with the monthly average at about 3.7 inches. The annual precipitation rate varies with location around the Sound, but generally ranges from 40 to 46 inches per year. The annual snowfall on the area is about 30 to 35 inches. During the winter months, precipitation results from the "prevailing westerlies." The greatest precipitation generally occurs during August when tropical storms reach the area. June and July offer the lowest monthly average precipitation.

Hydrology

Fresh Water Inflow

Three major drainage basins provide the Sound with fresh water. They are, in order of importance, the Connecticut River Basin (11,265 square miles), the Housatonic River Basin (1,950 square miles) and the Thames River Basin (1,470 square miles). Smaller streams in Connecticut, on the New York mainland and on Long Island drain an additional 1,300 square miles. Thus the entire drainage area to the Sound is about 16,000 square miles, or about 13 times the area of Long Island Sound. A summary of the average annual runoff from river basins draining to the Sound is shown on Table 1.

Another source of fresh water to Long Island Sound is groundwater outflow. The estimated subsurface outflow from groundwater in Connecticut is estimated to be about 190 cubic feet per second (cfs) and from Long Island about 260 cfs.

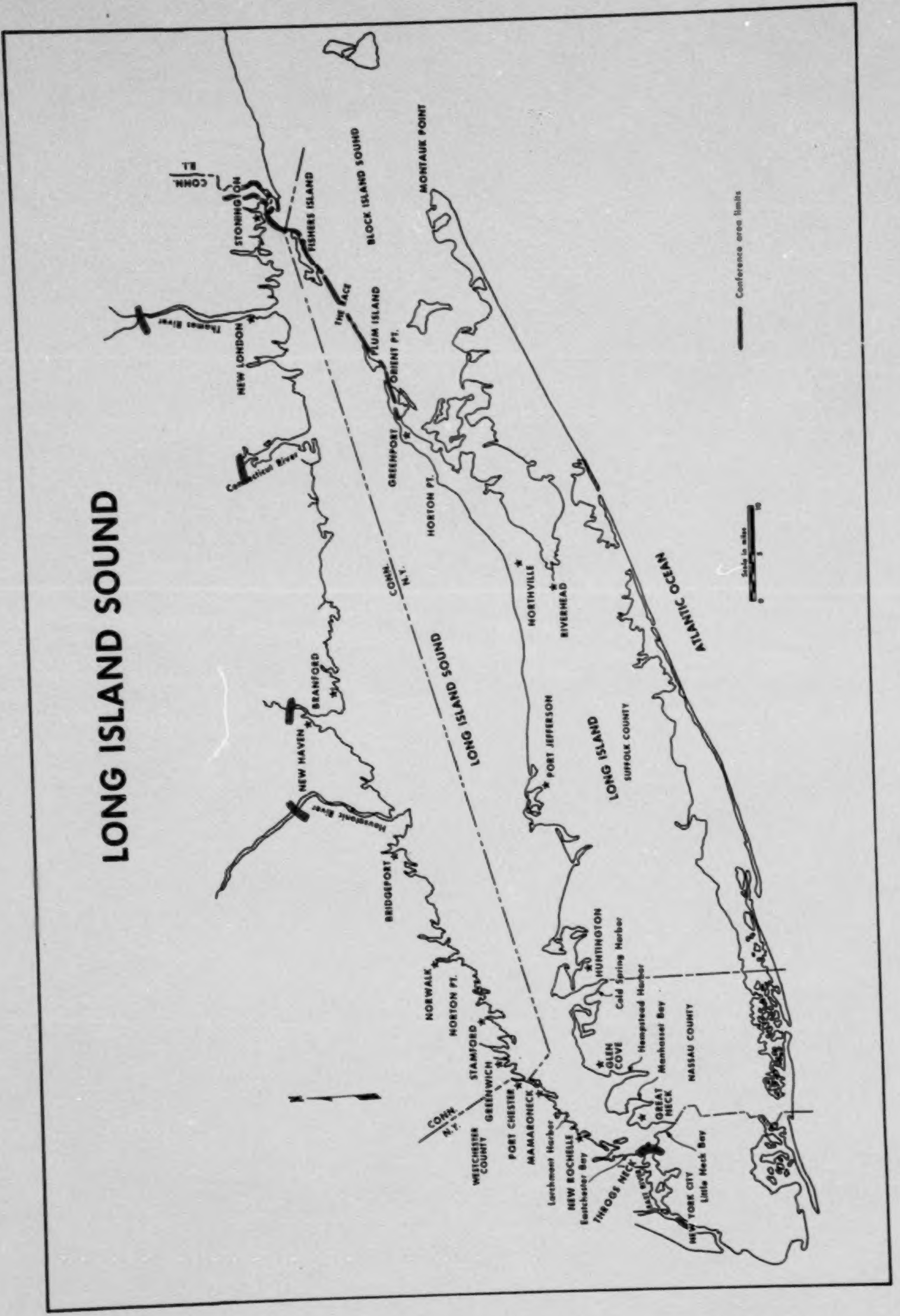
Circulation of Water

Movement of water in Long Island Sound is complex. Circulation is influenced by: inflow of salty Block Island Sound water; density differences between bottom and surface waters; inflow of fresh water from streams and groundwater; and by tides, winds, and the earth's rotation. There is also inflow of water from the East River at Throgs Neck which affects the western portion of the Sound near the New York Metropolitan Area.

Water from Block Island Sound enters Long Island Sound along the bottom through The Race. As the bottom water travels westward it is gradually mixed into the surface layer. Near New Haven, bottom water moves west at an average speed of almost six miles per month; at the western end the bottom transport is essentially zero.

Surface transport, generally composed of mixed bottom water, and surface runoff and groundwater seepage increases from west to east. Near New Haven the surface transport flows east at a rate of almost nine miles per month.

Tidal currents commonly average about 0.7 knots, and generally move parallel to the coast. Figure 2 shows the average surface velocities in the Sound. The polluted fresher water entering the Sound through Throgs Neck tends to keep to the Long Island shore. The saltier Block Island Sound water entering The Race tends to keep to the Connecticut shore.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WESTCHESTER COUNTY
Larchmont Harbor
NEW ROCHELLE
Eastchester Bay
THROGS NECK
EAST RIVER
NEW YORK CITY
Little Neck Bay
Scale in miles
0
5
10
Conference area limits

Figure 1

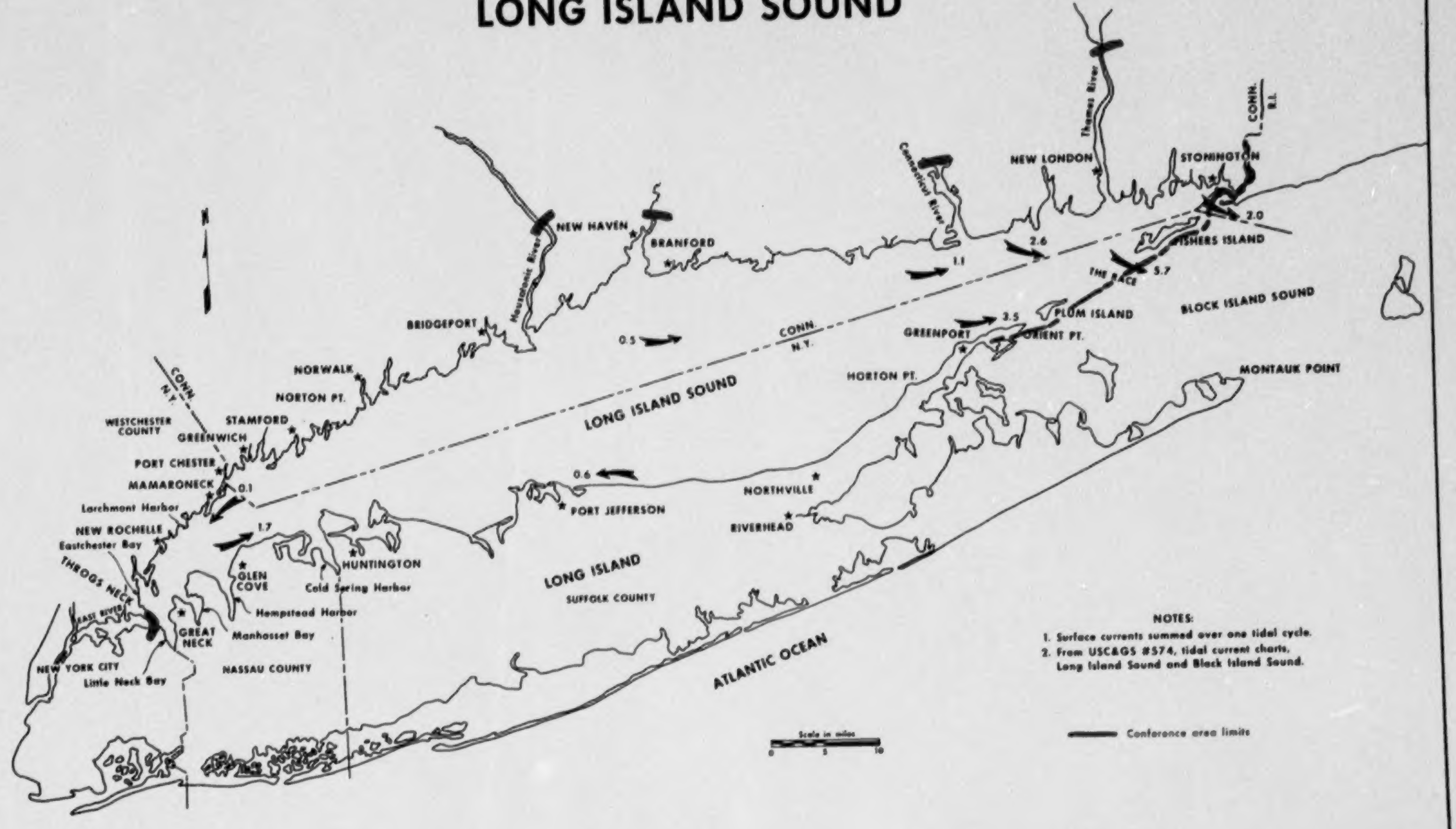
2a

TABLE 1

SUMMARY OF MAJOR SURFACE WATER RUNOFF TO LONG ISLAND SOUND

Drainage Basin	Drainage Area Square Miles	Average Annual Flow Cubic Feet Per Second
Long Island, N.Y.		
Glen Cove Creek	11	7.2
Mill Neck Creek	12	9.5
Cold Spring Brook	7	4.6
Nissequoque River	27	42.2
	57	63.5
Westchester County, N.Y.		
Hutchinson River	6	6.3
Mamaroneck River	23	29.3
	29	35.6
New York-Connecticut		
Byram River	36	10.7
Connecticut		
Connecticut River	11,265	19,100
Housatonic River	1,950	3,230
Thames River	1,470	2,420
Connecticut Coastal	1,150	2,060
	15,835	26,810
Total	15,957	26,920

SURFACE CURRENT-AVERAGE (KNOTS)
LONG ISLAND SOUND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MONTAUK POINT
ATLANTIC OCEAN
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1.7
0.6
0.5
1.1
2.6
3.5
5.7
2.0
Scale in miles
0
5
10
Conference area limits

NOTES:
1. Surface currents summed over one tidal cycle.
2. From USC&GS #574, tidal current charts, Long Island Sound and Block Island Sound.

Figure 2 2C

These surface currents cross the New York-Connecticut State lines near Fishers Island and the New York-Connecticut State line near Port Chester Harbor. When the waters near the State lines are polluted, tidal currents carry the polluted waters from one State into another.

Population

Conference Area (Immediately Bordering the Sound)

The conference area for Long Island Sound consists of those municipalities which immediately border the water body itself. In addition, it is necessary to define a larger area -- called the tributary region -- which consists of counties which are reasonably close to the Sound. The municipalities in the conference area will have the greatest impact on the Sound, whereas the tributary region contains not only these municipalities but also others which have a lesser but still significant impact.

In 1960, approximately two million people lived in those municipalities bordering the Sound excluding New York City. About half of the area's population was located in Connecticut municipalities and the other half in New York State municipalities. Table 2 shows the population in the conference area for selected years and area population distribution and population percentage changes estimated for 1969, 1980 and 2010.

The total population in the conference area is expected to rise from 2,480,000 in 1969 to 4,340,000 by 2010, an increase of 75 percent. During this period, the population of the New York portion, primarily the Nassau and Suffolk municipalities bordering the Sound, can increase by an estimated 100 percent, from 1,230,000 in 1969 to 2,450,000 in 2010. Table 3 shows, that of the total conference area population, the Connecticut portion was 53 percent in 1960 but by 2010 it is expected to decline to 44 percent. Conversely, the New York portion is expected to increase to 56 percent during this period.

Tributary (County) Region

Any consideration of the Long Island Sound conference area should take into account the socio-economic impact of the larger county-wide region that is tributary to the Sound. Counting whole counties (seven in New York -- Kings, Queens, New York, Bronx, Westchester, Nassau and Suffolk -- and four in Connecticut -- Fairfield, Middlesex, New Haven and New London), the population in the tributary region was 11,924,353 in 1960. The estimated 1969 population was 12,890,000; the population by 2010 is estimated at 18,610,000, an increase of 44 percent (see Table 4).

In 1960, the total population for the seven New York State counties was 10,335,839, whereas the four Connecticut counties totalled 1,588,514. For 2010, the New York counties' total is estimated at 15,640,000 and Connecticut's four counties at 2,970,000. This indicates that the New

York counties' population will increase by an estimated 42 percent between 1969 and 2010, compared to the Connecticut counties which will increase by 55 percent.

Comparison of Table 2 and Table 4 discloses that the population in the conference area is expected to increase by 75 percent between 1969 and 2010, while the population throughout the tributary region for the same period will increase more slowly--by 44 percent.

Population growth in the conference area and the larger tributary region will result in an increase in waste load to the waterways; the waste load per person will also rise due to the increased domestic use of such items as garbage disposal units.

The expected increase in leisure time during the coming decades will place greater demands on recreational facilities and the use of recreational equipment such as boats. Long Island Sound will be called upon to serve more and more people. At the same time, the divergent demands of recreation and other environmental needs versus waste disposal, power generation and commercial uses are competing with each other.

Economy

The discussion of the economy in the conference area is based only upon the seven counties directly adjoining Long Island Sound, namely Westchester, Nassau and Suffolk Counties on the New York side and Fairfield, Middlesex, New Haven and New London Counties on the Connecticut side.

For these seven counties slightly more than 91,000 business establishments (all Standard Industrial Classifications-SIC) were reported in 1968. Table 5 shows that the New York counties accounted for approximately 57,600 or more than half of the total number.

Roughly 8200 manufacturing establishments were located in this limited region, and the majority or 57 percent were in New York. Included among these establishments are such large water using or potential water polluting categories as food, textiles, paper, chemicals, petroleum and primary metals.

Although the total number of manufacturing establishments in the area remained almost constant between 1964 and 1968, it is expected according to the Office of Business Economics employment projections, that manufacturing in the conference area will increase by 30 percent in the next four decades.

Considering employment projections in the six major water-oriented industries cited above, the importance of the food and chemical industries in the area is expected to increase, whereas the textile, paper and primary metals industries are expected to decline. These industrial

TABLE 2

DISTRIBUTION OF POPULATION IN CONFERENCE AREA FOR 1960, 1969, 1980 AND 2010[1]

(thousands)

					Percentage Increase		
	1960	1969	1980	2010	1969-1980	1980-2010	1969-2010
Connecticut Portion	1,060	1,250	1,490	1,890	19	27	51
New York Portion	930	1,230	1,460	2,450	19	68	99
AREA TOTAL	1,990	2,480	2,950	4,340	19	47	75

TABLE 3

CONFERENCE AREA POPULATION AS PERCENT OF TOTAL FOR 1960, 1969, 1980 AND 2010

	1960	1969	1980	2010
Connecticut Portion	53	50	50	44
New York Portion	47	50	50	56
AREA TOTAL	100%	100%	100%	100%

TABLE 4

TRIBUTARY (COUNTY) DISTRIBUTION OF POPULATION[1]

(thousands)

					Percentage Increase		
	1960	1969	1980	2010	1969-1980	1980-2010	1969-2010
Connecticut (4 counties)	1,588	1,910	2,280	2,970	19	30	55
New York (7 counties)	10,336	10,980	12,320	15,640	12	27	42
REGION TOTAL	11,924	12,890	14,600	18,610	13	27	44

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[1] Information contained in the table was derived from the U.S. Census of Population 1960, PC(1)-8A, The Demographic Projections for New York State Counties to 2020 A.D., New York State Office of Planning Coordination and the Population Survey, 1970, Long Island Lighting Co. With the exception of 1960, Connecticut population figures are based upon Environmental Protection Agency estimates.

TABLE 5

1968 DISTRIBUTION OF BUSINESS ESTABLISHMENTS IN LONG ISLAND REGION BY STATE, COUNTY AND MAJOR BUSINESS CLASSIFICATION[1/]

	Total No. of Establishments[2/]	Agricultural Services Mining	Contract Construction	Manufacturing	Transportation	Wholesale	Retail	Finance, Insurance, Real Estate	Services (Hotels, Repairs, etc.)
New York									
Nassau	26,483	425	2,558	2,187	800	2,388	7,662	2,655	7,808
Suffolk	13,440	238	1,832	1,169	512	771	4,470	797	3,651
Westchester	17,643	297	1,807	1,265	502	1,282	5,033	2,206	5,251
SUB-TOTAL	57,566	960	6,197	4,621	1,814	4,441	17,165	5,658	16,710
% of Sub-Total	100	1.7	10.8	8.0	3.2	7.7	29.8	9.9	29.0
Connecticut									
Fairfield	14,771	204	1,730	1,589	405	944	4,212	1,171	4,516
Middlesex	1,943	29	279	243	52	94	623	116	507
New Haven	13,519	96	1,287	1,506	396	1,034	3,952	1,199	4,049
New London	3,291	53	353	224	107	200	1,183	228	943
SUB-TOTAL	33,524	382	3,649	3,562	960	2,272	9,970	2,714	10,015
% of Sub-Total	100	1.1	10.9	10.6	2.9	6.8	29.7	8.1	29.9
REGION TOTAL	91,090	1,342	9,846	8,183	2,774	6,713	27,135	8,372	26,725
% of Total	100	1.5	10.8	9.0	3.0	7.4	29.8	9.2	29.3

[1/] County Business Patterns, 1968, U.S. Dept. of Commerce, Bureau of the Census.
[2/] Unclassified Establishments excluded.

employment changes will come about by means of technological advances or the use of automated equipment. It is not possible at this time to obtain employment data for the petroleum industry but the anticipated increase of petroleum shipping in the Sound indicates that this industry will be an important factor in the future economic development of the area.

Extensive land requirements for residential, industrial and commercial development will decrease the amount of agricultural land usage and agricultural employment in the area, even though the value of the agricultural output may increase. The decline in the agricultural industry may be offset by the growth of other industries, such as oyster shellfishing and services.

At present, the shellfish and fin fish industries significantly contribute to the economic importance of the conference area. With improved water quality, the economic value of these two industries could be greatly enhanced. Detailed information concerning these industries will be discussed in a later section.

Some indication of the overall economic value of the region can be measured in terms of the dollar value of the region's physical output. In 1963, the region accounted for $4.4 billion dollars worth of economic production (value added by manufacturers).

II - WATER USES

Industrial and Municipal Water Supply

The waters of Long Island Sound with salinities of about 20 parts per thousand are unsuitable as a source of municipal water supply.

Few industrial plants withdraw Sound water for in-plant process use because of high salinities. Seventeen fossil fuel power generating stations and many industrial plants located around the periphery of the Sound use Sound waters for cooling purposes. An estimated 2,100 mgd of water withdrawn from the Sound or its harbors were used for cooling in conjunction with power generation during 1967. To meet projected increases in local power demands, several nuclear and conventional steam electric power plants have been proposed. Cooling water withdrawals from Long Island Sound for generating this power are estimated at 3,300 mgd by the end of 1970 and 17,400 mgd by 1990.

The installed and planned power capacity of conventional steam and nuclear power stations using cooling water from the Sound are summarized below. An estimate of the amount of cooling water used is also included. Appendix A, Tables A-1 and A-2 list the conventional steam electric power plants and the nuclear power stations used to develop the summary table. Appendix Figure A-1 shows the location of the power stations.

Since more power production will be needed to sustain the projected population and industrial growths, detailed studies should include the effects of heated effluent on the ecology of Long Island Sound.

SUMMARY OF CONVENTIONAL STEAM AND NUCLEAR ELECTRIC POWER PLANTS ON LONG ISLAND SOUND

	Installed Capacity	Planned Capacity*	
	1967	1970	1990
Conventional Steam Electric Power Plants			
Installed Capacity (megawatts)	2,930	4,520	5,370
Estimated Cooling Water Use (mgd)	2,100	3,300	3,900
Nuclear Electric Power Plants			
Installed Capacity (megawatts)			10,230
Estimated Cooling Water Use (mgd)			13,500
Total			
Installed Capacity (megawatts)	2,930	4,520	15,600
Estimated Cooling Water Use (mgd)	2,100	3,300	17,400

*Recent controversies regarding thermal pollution have delayed construction of many planned stations.

Commercial Navigation

In 1968, there were 20 active commercial shipping ports in Long Island Sound (10 each in New York and Connecticut). The major product shipped on Long Island Sound -- 68.5 percent of total tonnage -- was petroleum and related products. The remaining major products shipped were sand and gravel (17.4 percent) and coal and coke (7.0 percent). Shipping in Long Island Sound is heavily oriented to the Connecticut ports; in 1968, 24 million tons were shipped in Connecticut ports and 12 million tons were moved in New York ports.

The importance of shipping on Long Island Sound can be appreciated by recognizing that 90 percent of Connecticut's entire fuel supply arrives by water. Petroleum products in 1968 accounted for 18.8 million tons of cargo in Connecticut ports and 6.1 million tons in New York ports. In 1969, there were 102 oil unloading facilities on the Sound, with 49 in New York and 53 in Connecticut. There will be a need to expand these facilities to meet the growing demand for petroleum products anticipated in the conference area.

Commercial ferry service on Long Island Sound handles about 500,000 passengers a year and about 130,000 automobiles. Ferry service (primarily seasonal) runs between New London and Greenport, New London and Fishers Island, Greenwich and offshore Islands, Bridgeport and Port Jefferson. Passenger numbers have gradually declined for both the Bridgeport and Greenwich ferries.

Passenger and cargo handling vessels made over 270,000 trips on Long Island Sound in 1969. With the expected increases in shipping, the likelihood of accidental spillages of petroleum products and the overboard discharge of sewage rises.

Recreation

Swimming

Long Island Sound has approximately 400 miles of recreational shoreline, 76 miles of which may be categorized as beach area. Twelve public recreation areas with beaches and many private beaches associated with individual camps and homes are located on the Sound's waters. More than 3.5 million visits per year are made to Long Island Sound beaches with visits being split equally between New York and Connecticut.

About 135,000 people or nearly 5-1/2 percent of the Connecticut population goes swimming on a sample Sunday afternoon, with approximately 60,000 at saltwater beaches. This number is greater than the Bureau of Outdoor Recreation "standard of supply" (total fresh and saltwater) of three percent of the population (87,900). Connecticut State Parks have a capacity for 50,000 saltwater swimmers per day. Peak day demand is estimated as high as 100,000 visits, 25,000 of which are from New York State. The number of swimmers in Connecticut is projected to almost triple by the year 2010.

Ten percent of the State Park attendance on Long Island in 1969 was at the two north shore state parks (Sunken Meadow and Wildwood). Bathing activity at these two parks accounted for 1.0 million visits in that year. New York State indicates an expected regionwide increase of 50 percent in park visits for the facilities in and around the New York City area in 1975.

Since much of the swimming on Long Island Sound takes place on private beaches for which there are no records, the estimated value of bathing as a recreational activity must be based upon the public sector data. Multiplying $1.50 (Source - Bureau of Outdoor Recreation) for the value of a swimming recreation day by 3.5 million visitors in 1969 to Long Island Sound beaches shows an annual value of $5.25 million. The magnitude of this value is illustrated when visualized as the equivalent of a capital investment of $65.5 million at 4-7/8 percent repayable in principal and interest over a 20 year period at a rate of $5.25 million annually.

Bathing activity at beaches on the Sound by the year 2000 will more than double according to State estimates. The estimated annual value of the activity can increase to more than $10.5 million. The costs of food, transportation and entertainment associated with swimming if added to this value increases the total estimated annual expenditure for the bathing activity to some $42 million by the year 2000 (estimate is based upon Outdoor Recreation Resources Review Commission data).

Recreational Boating

Recreational boating has increased significantly in the last decade. In New York State, over 120,000 boats are registered in the New York City-Nassau-Suffolk-Westchester County area. This number is expected to increase 63 percent between 1965-1975, with a major portion of both use and growth occurring in the Long Island area (Nassau-Suffolk Counties). The number of boats registered in New York and operating on the Sound will probably increase more than 150 percent by the year 2010.

About 65,000 boats of all sizes and types are based in Connecticut and operate on Long Island Sound. The number of recreational boats in Connecticut coastal waters is expected to increase about eight percent per year. The number of boating recreation days per year is expected to increase from 6.2 million in 1960 to about 15 million in 2010.

The recreational boating industry is big business. The annual value of this activity approaches $642 million for Long Island Sound and could increase to some $1.5 billion by the year 2010. This value consists of estimates of the value of all boats operated on the Sound, the value of the recreation day and the value of the peripheral expenses associated with owning a boat.

Fishing

Fishing as a sport in Long Island Sound is extremely popular due to the variety of both fresh and saltwater species found within a short trip from the Sound's shores.

The annual demand for saltwater fishing in Connecticut is presently estimated at 2.8 million activity days and is expected to double by the year 2000. This fishing activity based upon a conservative per person cost of only $1.50 daily represents a value to the area of over four million dollars.

New York State reported an estimated 1.6 million persons were fishing on Long Island Sound in 1970; of course the number of days each person goes fishing will vary. Sport fishing in New York State is expected to double for the period 1965-1975.

Shellfishing

People living around Long Island Sound are fortunate to have oysters, hard clams, lobsters and some bay scallops in their shoreline waters.

According to the New York State Bureau of Marine Fisheries, of the 433,000 acres of Long Island Sound in New York State, over 100,000 acres are suitable for shellfish production. Approximately 61,000 acres, including productive and non-productive areas, have been closed to shellfishing.

The Public Health Service's 1966 National Register of Shellfish Production Areas reports that in Connecticut, of a total of 83,000 acres of shellfish growing areas, about 15,000 acres are closed to shellfishing. The Connecticut Shell Fish Commission administers approximately 57,000 acres of franchised, leased and public shellfish grounds.

Approval or condemnation of a shellfish area is predicated upon bacteriological data resulting from water samples collected by appropriate state or Federal agencies and the proximity to an actual or potential source of pollutants. Other factors such as hydrographic conditions, presence of pesticides and radionuclides, and available dilution water are also considered. (See Section IV, Description of Criteria.)

The estuaries and coastal harbors surrounding Long Island Sound are significant areas of shellfish production. These areas contain the optimum combinations of bottom type, temperature, salinity and water quality which are key factors in shellfish growth. Estuaries, harbors and embayments are also areas of urban and industrial development. Polluted by waste discharges, many of these areas are closed to shellfishing.

Closed Shellfish Areas in New York - Moving from west to east:

The area of Long Island Sound west of a line between the Byram River on the north and Prospect Point on the south including the entire Westchester County shoreline, East River, Little Neck Bay and Manhasset Bay.

In addition, the following harbors are closed or partially closed to shellfishing:

Hempstead Harbor
Vicinity of Matinicock Point
Oyster Bay Harbor (part)
Cold Spring Harbor (part)
Huntington Harbor (part)
Centerport Harbor (part)
Northport Harbor (part)
Nissequogue River
Port Jefferson Harbor (part)
Offshore area of Northville (oil unloading facility)
Vicinity of Mattituck Inlet
Vicinity of Inlet Point (Greenport sewer outfall)
Vicinity of west end of Fishers Island

Closed Shellfish Areas in Connecticut - Harbors and estuaries surrounding the following municipal areas, moving from west to east:

Greenwich
Darien - Stamford
Darien - Norwalk
Norwalk
Wesport - Fairfield
Bridgeport
Stratford - Milford (Housatonic River)
Milford
New Haven
East Haven - Branford
Thimbles Islands
Madison - Clinton
Old Saybrook - Old Lyme (Connecticut River)
Four Mile River
Bride Brook
Groton - New London (Thames River)
Groton - Mumford Cove
Groton - Mystic River
Stonington

Figure 3 shows the areas of shellfish closure in Long Island Sound.

Closure of these shoreline areas eliminates the shellfish grounds most accessible to the commercial and recreational shellfishermen. The Connecticut Shell Fish Commission indicates that the present sport fisheries are generally confined to the eastern Connecticut shoreline from Branford to Stonington, and the market areas extend westerly from Branford.

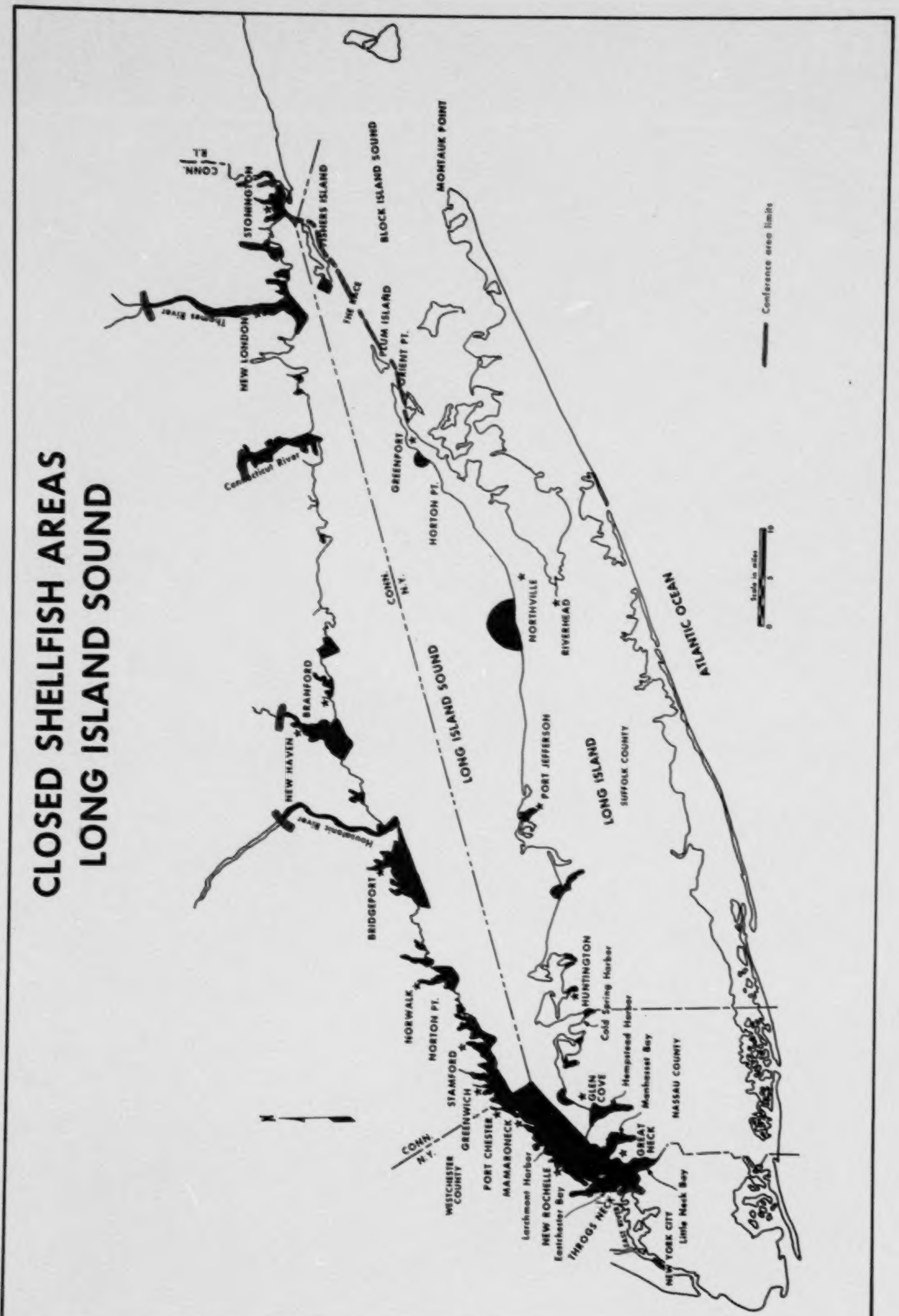
Shellfish ground closures have also contributed, in part, to the decrease in commercial shellfishing activity. Closure of near-shore waters has forced commercial fishermen to relocate their shellfish beds further out where conditions often impair or slow shellfish growth, consequently requiring longer work hours and a greater expenditure of effort. Seed and market shellfish are still raised in closed areas, but are transplanted under the supervision of the State Health Department to open areas where they are naturally self-purified. This activity is particularly prevalent in Branford, New Haven Harbor, Housatonic River, Darien and Norwalk areas of Connecticut. In New York, hard shell clams are harvested from the closed beds of the Westchester and Nassau County shores for transplant to the open waters along the Atlantic coast (south shore of Long Island).

Prior to 1920, oyster companies operating from New Haven Harbor sent seed oysters to the bays in Long Island and Narragansett Bay in Rhode Island. Several companies transplanted seed oysters from Connecticut to Gardner's Bay and Shelter Island Sound in New York and reharvested them for processing in their plants in New Haven. Other companies, similarly, operated in eastern Long Island waters and in Oyster Bay. This production represented an annual business of more than five million dollars to the shellfish industry during that period.

In 1965 and 1966 a group of local fishermen from Stratford, Connecticut, began a shell planting program in an attempt to increase the productivity of public beds in the Housatonic River. In 1966, the Connecticut Shell Fish Commission received a grant from the U.S. Department of the Interior to be used for the rehabilitation of the oyster industry. At this time the Commission provided 12,000 bushels of shells for planting and, together with additional shells from the local harvesters, 17,000 bushels were laid. The Commission reported that during the summer of 1966, an excellent oyster "set" was obtained. This was the only planting of materials that took place on any of the natural beds of Connecticut. This limited local effort was successful.

Pollution Affecting Shellfisheries

In 1970, the Connecticut State Department of Health issued new shellfish closure lines affecting communities in Branford, Norwalk and Darien. Some of these closures forced the shellfishermen to alter their operations and move their shellfish stock further offshore into waters acceptable for harvesting. Mr. J. Richard Nelson, President, Long Island Oyster Farms, Incorporated, New Haven, Connecticut, indicated that their company had extensive seed beds in Upper New Haven Harbor and the Quinnipiac River prior to 1920. Since that time these beds have become unfit for planting because of sludge deposits resulting from inadequately treated wastewater discharges. Sludge from pollution has destroyed at least 1,000 acres of formerly productive seed beds in New Haven Harbor



CLOSED SHELLFISH AREAS
LONG ISLAND SOUND

CONN.
R.I.
STONINGTON
FISHERS ISLAND
BLOCK ISLAND SOUND
MONTAUK POINT
Thames River
NEW LONDON
THE RACE
PLUM ISLAND
ORIENT PT.
Connecticut River
GREENPORT
HORTON PT.
CONN.
N.Y.
NORTHVILLE
RIVERHEAD
ATLANTIC OCEAN
BRANFORD
NEW HAVEN
LONG ISLAND SOUND
PORT JEFFERSON
LONG ISLAND
SUFFOLK COUNTY
Housatonic River
BRIDGEPORT
HUNTINGTON
Cold Spring Harbor
Hempstead Harbor
Manhasset Bay
NASSAU COUNTY
NORWALK
NORTON PT.
STAMFORD
GREENWICH
GLEN COVE
GREAT NECK
CONN.
N.Y.
WESTCHESTER COUNTY
PORT CHESTER
MAMARONECK
Larchmont Harbor
NEW ROCHELLE
Eastchester Bay
THROGS NECK
NEW YORK CITY
Little Neck Bay
Scale in miles
0
5
10
Conference area limits

Figure 3

11a

and the Quinnipiac River. To augment the supply of seed oysters, Mr. Nelson's firm constructed an oyster hatchery at Northport, New York, at a cost close to one million dollars.

Six hundred acres of shellfish beds are active during part of the year at Stony Creek in Branford where oysters are harvested for direct marketing. However, because of pollution from nearby summer homes and cottages, this area is closed to shellfishing annually from May 1 to October 1.

Three shellfish dealers operating in Norwalk Harbor reported that the cost for harvesting shellfish has increased as a result of the shellfish closure lines being extended further off shore. The dealers claim that about 20% more working time is necessary in working the hard clam and oyster beds because of travel distance committed to seek suitable grounds. The shifting of shellfish populations from one location to another involves a risk that can cause a 50 percent loss when transplanting hard clams and a 15 to 20 percent loss when handling oysters.

The grounds inside the chain of islands in Norwalk Harbor are considered the best producing grounds on the east coast. The shellfish harvested here represent the best in growth, development and flavor. Should the shellfish closure lines be moved beyond the islands, this would reduce the supply of good beds and force the fishermen to use questionable grounds in deeper waters and the risk of greater losses due to the lack of protection from storms.

Water pollution along the shores of Greenwich, Stamford and Darien has contributed to closing of several oyster firms in the area. Out of 11 oyster dealers which have operated in the Norwalk-Darien area, five have gone out of business with little chance of returning. The Norwalk Estuary, including parts of Darien, produces approximately one million dollars worth of shellfish annually.

Accordingly, the direct and indirect damages to the shellfishing industry are extensive as a result of water pollution. It has been estimated by the Connecticut Shellfish Commission and Mr. Richard Nelson, President, Long Island Oyster Farms, Inc. (see Appendix C) that, as a result of the closures due to pollution, losses to the shellfish industry over the past 50 years exceed $500 million. Comparison by Mr. Nelson of the oyster yield between 1920 and 1970 indicates a difference of $17 million in 1970 alone.

III - SOURCES OF POLLUTION

Long Island Sound and its estuaries, harbors and embayments receive pollutional discharges from municipalities, institutions, industries, federal installations, combined sewer overflows, recreational boating and discharges of oil and petroleum products. Thermal discharges and disposal of dredged spoils also affect the quality of waters in the Sound.

Municipal and Institutional Waste

A total of 60 municipal and institutional systems serving approximately 1,272,000 persons discharge approximately 170 million gallons per day (mgd) of wastewater into the open waters of Long Island Sound and its embayments. Twenty-two of these systems are in New York and 38 are in Connecticut. Available data regarding these sources are summarized in Appendix B, Table B-1. The general location of each discharge is also shown in Appendix B, Figure B-1. Of the 60 systems listed, five in Connecticut serving less than one percent of the sewered population, are individual septic tank communities, 33 (12 in New York and 21 in Connecticut) serving 73 percent provide primary treatment; and 22 (10 in New York and 12 in Connecticut) serving 27 percent provide secondary treatment. All of the primary and secondary treatment plants have chlorination facilities.

Thirteen systems, accounting for about 20 percent of the municipal flow, discharge directly to Long Island Sound after primary or secondary treatment. The Mamaroneck and New Rochelle primary treatment facilities in New York are the largest of these systems. The 47 other facilities discharge the remaining 80 percent of the wastewater flow to the embayments and estuaries of the Sound or to subsurface fields. Nearly all of these facilities provide at least primary treatment prior to discharge. The primary facilities at Bridgeport and New Haven, Connecticut are the largest, discharging 64 mgd to the tributary waters of the Sound. Five relatively small systems in Connecticut are presently served by individual septic tanks with treatment facilities scheduled for completion by June 1971.

The ratio of area population served (1,272,000) to area total population, (2,480,000), indicates that 55 percent of the population in 1969 were served by primary or secondary sewage treatment facilities. Service is projected for 1,610,000 people by 1980. In order to sewer 100 percent of the population in 2010, facilities will be needed for 4,340,000 people.

Federal Facilities

There are sixteen (16) Federal installations including eleven (11) lighthouses (see Appendix B, Table B-2) discharging approximately 2.0 mgd of treated and untreated wastewater to Long Island Sound and its embayments and estuaries (see Figure B-2). Approximately 5.3 mgd of untreated cooling water is also discharged from Federal installations.

Remedial measures are scheduled for completion at all lighthouses by FY 1972. These measures include incinerator toilets, municipal connections and subsurface disposal.

The U.S.D.A., Animal Disease Laboratory at Plum Island, New York discharges 0.046 mgd of domestic wastewater after septic tank treatment and chlorination. Approximately 0.055 mgd of laboratory wastewater is comminuted, neutralized and sterilized by a heat-pressure process prior to discharge. The Environmental Protection Agency (EPA) has recommended subsurface disposal for the septic tank effluent and the laboratory wastewater after upgrading to secondary treatment.

The U.S. Air force Plant #43, Avco Lycoming, at Stratford, Connecticut, provides treatment for 0.576 mgd of industrial wastewater prior to discharge to the Housatonic River. Sanitary wastes are discharged to the Stratford Municipal System.

There are potential problems at this plant associated with intermittent discharges of oily and industrial wastes. The State of Connecticut has requested that Avco Lycoming provide facilities by October 31, 1972 to prevent any such discharges without appropriate treatment. The State has outlined the following schedule for abatement:

A. On or before July 31, 1971 submit for the review and approval of the Water Resources Commission an engineering report describing all sources and volumes and characteristics of all industrial wastes and oils and describe any required treatment facilities;

B. On or before December 31, 1971 submit for the review and approval of the Water Resources Commission contract plans and specifications for the required treatment facilities;

C. On or before February 29, 1972 verify to the Water Resources Commission that construction of the required facility has been started;

D. On or before October 31, 1972 verify to the Water Resources Commission that the constructed facilities have been placed in operation.

Avco Lycoming Division is developing a proposal which will include recommendations for abatement of these discharges. The Water Quality Office of the Environmental Protection Agency has contacted the Air Force to ensure that appropriate measures are taken to fund and implement the plan within the timetable outlined by the State.

The U.S. Navy New London Submarine Base at Groton, Connecticut, discharges 1.30 mgd of domestic wastewater to the Thames River after primary treatment. The base will connect to the Town of Groton's sewer system which will provide secondary treatment.

The U.S.S. Fulton is a submarine tender which discharges approximately 0.04 mgd of untreated domestic wastewater to the Thames River. In April, 1971, the Fulton will undergo a major overhaul during which on-board sewage treatment units will be installed. Provisions will also be made to enable the ship to connect to a municipal sewer which will be constructed on the pier as a joint Federal-Connecticut Department of Transportation project. This will provide backup facilities as the on-board units undergo testing to determine their operating characteristics under service conditions.

The U.S. Navy owns four barges which are berthed at the General Dynamics piers to provide temporary quarters for Naval personnel while their ship is under repair. Facilities completed in November, 1970 pump wastewater to the dockside collection system which discharges to the Town of Groton System.

Industrial Waste

At least 137 sources of industrial wastewater discharge to the embayments and estuaries of Long Island Sound. None discharges directly to the Sound. Five of these sources are in New York and the remaining 132 are in Connecticut. (See Appendix Table B-3). The general location of each source is shown in Appendix Figure B-3.

Industrial wastewaters result from the processing operations associated with the manufacture of food and kindred products, primary metals products, chemicals and allied products, and textiles. The metal finishing industry, in particular, is heavily concentrated in Connecticut. Significant volumes of wastewater result from the pickling, plating and anodizing processes associated with this industry.

Flow from industrial operations contributes a variety of contaminants including, in addition to oxygen consuming materials, oil, grease, solvents and toxic substances, chromic and other acids, cyanide and alkali.

Combined-Sewer Overflows

Sixteen municipal collection systems (four in New York and 12 in Connecticut) serving approximately 680,000 people have combined sewers (See Appendix Table B-4). When it rains, large quantities of untreated sanitary and industrial wastewater can be discharged directly to the receiving waters via combined sewer overflows. These overflows, a mixture of wastewater and stormwater, contribute organic material which decrease dissolved oxygen, introduce floating, suspended and settleable solids which reduce the aesthetic and recreational values of the water and increase bacterial densities posing a danger to public health. Other pollutants such as toxic substances, oil and grease are often contained in the overflow water.

Recreational Boating Wastes

The presence of the nearly 240 marinas with over 64,000 berths which service the thousands of boats registered in counties bordering the Sound indicate that the waters of the conference area are used extensively for recreational boating. Countless other boats also travel into and along the Sound for weekend or extended visits. Waste from these recreational boating activities constitute one more source of pollution to the waters of the Sound. The discharge of untreated human fecal matter into the Sound and its estuaries adds pathogenic bacteria contributing to a health hazard where the water is used for contact recreation or harvesting of shellfish for consumption. Bilge pumping and litter from boating activities is another source of pollution causing a deterioration of the aesthetic quality of the environment.

Discharges of Oil and Petroleum Products

The Sound is used as a major transportation route for large oil tankers and barges carrying both crude and refined petroleum. A large number (102 in 1969) of oil unloading and storage facilities dot the shoreline of this body of water. Two offshore oil unloading facilities are also located on the Sound; at the Long Island Lighting Company near Port Jefferson, New York and at Northville Industries, Incorporated near Northville, New York. In 1968, about 25 million tons of petroleum and petroleum products were delivered to storage facilities along the Sound via commercial ships.

The discharge of a large amount of oil into Long Island Sound could be a catastrophe to the ecology of this water body. In 1969, there were 17 recorded oil pollution incidents in the Sound. There is no doubt that there were many minor spills of petroleum products into the Sound which were unreported and therefore unrecorded. Two major spills of oil occurred in 1970 and 1971, respectively. On June 5, 1970, 670,000 gallons of #2 fuel escaped into Bridgeport Harbor due to a faulty valve at a petroleum tank farm located at Bridgeport, Connecticut. On January 23, 1971, 386,000 gallons of #2 fuel and kerosine escaped into the Sound due to the grounding of an oil tanker in the vicinity of New Haven, Connecticut. These spills caused damage to boats and shorefront properties and were harmful to marine life and water fowl. Max Blumer, Senior Scientist of the Woods Hole Oceanographic Institute in a paper "The Problem of Oil Pollution In Coastal Waters" has said, "All crude oils are poisons for all marine organisms; many crude oil distillates are more severely poisonous because they contain higher proportions of the immediately toxic compounds. Long term toxicity may harm marine life that is not immediately killed by spills, and oil can be incorporated into the meat of marine animals, making it unfit for human consumption. Crude oil and oil products may cause cancer in marine organisms and in man; even at very low concentrations oil may interfere with processes which are vital for the propagation of marine species."

Disposal of Dredging Spoils

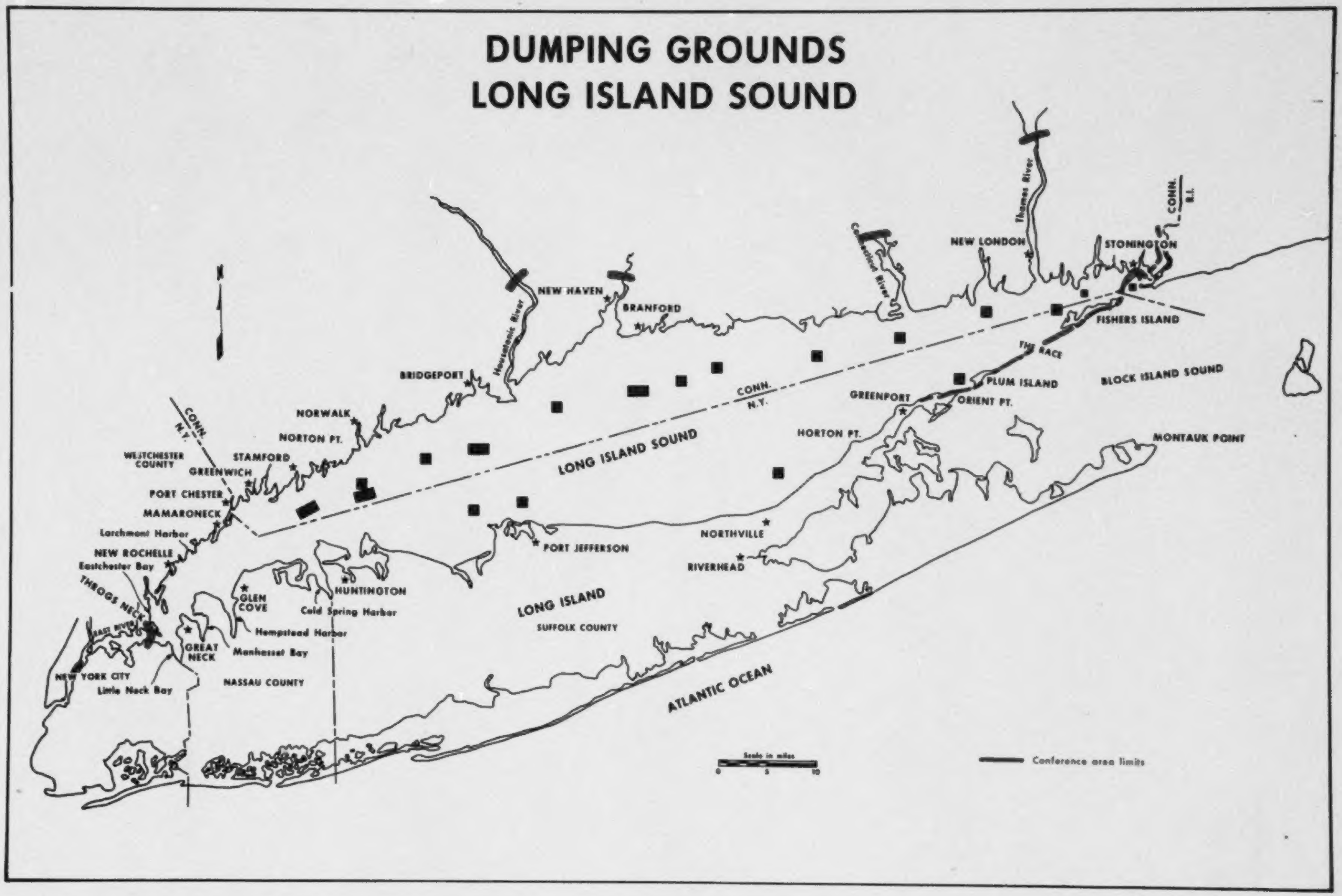
There are 19 disposal areas located in the Sound which are controlled by the U.S. Army Corps of Engineers (see Figure 4). During 1968, more than 1.4 million cubic yards of material dredged from nearby rivers and harbors were dumped into these disposal areas. These dredged materials, often containing pollutants which have settled as bottom deposits in the estuaries and embayments, can affect water quality.

Municipalities located around Long Island Sound do not dispose of sewage sludge in the Sound. Sewage sludge from New York's Glen Cove, Roslyn, Belgrave and Port Chester water pollution control facilities is barged for ocean disposal in the New York Bight, 12 miles east of Sandy Hook, New Jersey. Sludge from the conference area's remaining municipal facilities is disposed of in sanitary landfills.

Thermal Pollution

Seventeen fossil fuel steam electric generating plants with a total installed capacity of 2,930 megawatts use the waters of Long Island Sound for cooling purposes. Many industries also withdraw cooling water from the Sound. For power generation alone, an estimated 2,100 mgd of water from the Sound was used in 1967 for this purpose. The effect that these heated water discharges have upon the Sound's ecology will depend upon many variables which include: the temperature and volume of the heated effluent; the depth and dispersion pattern of the rejected thermal waste at the outfall; the circulation pattern and depth of the receiving water; and the nearness to other discharges. Increased water temperature from these discharges can upset the entire ecological system with proliferation of less desirable flora and fauna and decreased assimilative capacity. Researchers are currently investigating the possible benefits from thermal discharges under controlled conditions, but there is general agreement that the overall effect of indiscriminately adding heated effluents to the Sound would be detrimental.

The projected increase in population and industrial activity will demand greater power generating capacity. The estimated cooling water requirements to meet these future demands will exceed 17,000 mgd by 1990. The possible adverse effects from the release of this significant quantity of waste heat into the water environment of the Sound must be a consideration in the development of any new power generating facility.



DUMPING GROUNDS
LONG ISLAND SOUND

N
CONN.
N.Y.
WESTCHESTER COUNTY
GREENWICH
STAMFORD
PORT CHESTER
MAMARONECK
Larchmont Harbor
NEW ROCHELLE
Eastchester Bay
THROGS NECK
EAST RIVER
NEW YORK CITY
Little Neck Bay
GREAT NECK
Manhasset Bay
NASSAU COUNTY
Hempstead Harbor
GLEN COVE
Cold Spring Harbor
HUNTINGTON
NORWALK
NORTON PT.
BRIDGEPORT
Housatonic River
NEW HAVEN
BRANFORD
LONG ISLAND SOUND
CONN.
N.Y.
PORT JEFFERSON
LONG ISLAND
SUFFOLK COUNTY
NORTHVILLE
RIVERHEAD
HORTON PT.
GREENPORT
Connecticut River
NEW LONDON
Thames River
STONINGTON
CONN.
R.I.
FISHERS ISLAND
THE RACE
PLUM ISLAND
ORIENT PT.
BLOCK ISLAND SOUND
MONTAUK POINT
ATLANTIC OCEAN
Scale in miles
0
5
10
Conference area limits

Figure 4

IV - PRESENT WATER QUALITY

The extent to which Long Island Sound is affected by pollution can be shown by comparing existing quality with the approved state and Federal water quality standards. These standards and their associated criteria are furnished in Appendix D. The Environmental Protection Agency (EPA) conducted two surveys, one in late September 1969 and another in July 1970, to collect data for defining existing quality. The 1969 survey was concerned primarily with the quality of the open waters of the Sound. The July 1970 survey concentrated on harbors and embayments along the north shore of the Sound from Throgs Neck to the Connecticut-Rhode Island state line. Data regarding both surveys are summarized in Appendix E and F. The results of other studies conducted by the Interstate Sanitation Commission and the States of New York and Connecticut and Nassau County were also reviewed to supplement the EPA data.

Pollution problems exist in the harbors and embayments of the Sound which are surrounded by the highly developed urban areas. Water quality in these areas was below the approved standards. Areas where existing water quality does not conform to the standards are identified in Table 6 and shown in Figure 5. Table 7 lists those areas where surveys conducted by State, interstate and County agencies showed quality below the standards. The specific problems are discussed in this section.

Description of Criteria

Important criteria established by the water quality standards to characterize water quality and the effects of pollution include temperature, dissolved oxygen and bacteria. Nutrient limits, although not established by the standards, also characterize water quality and show the effects of pollution and the ability of the water to support growth of aquatic plants.

Temperature affects the solubility of dissolved oxygen, rates of chemical and biochemical reactions, bacterial growth rates and the growth of biological flora and fauna. The temperature of a body of water will depend upon the season of the year, water depth, currents and, the discharges of large volumes of hot "cooling" water. Deep waters such as those found in lakes, estuaries and the ocean show a smaller response to climatic change than shallow waters.

Adequate levels of dissolved oxygen are necessary to support the survival and propagation of fish and other forms of aquatic life. Dissolved oxygen is also necessary for aerobic bacterial action which stabilize decomposable organic material. The amount of dissolved oxygen in water will depend upon the transfer rate of oxygen from the atmosphere, photosynthetic oxygen production, the imposed oxygen demanding waste load and salinity and temperature. Where the oxygen demand of organic materials exceeds the available dissolved oxygen, anaerobic conditions exist and the water becomes septic and foul-smelling.

A primary source of bacteria in water is the discharge of raw and inadequately treated domestic wastes. Total coliform densities have traditionally been used as an indicator of human contamination since they occur in the fecal matter of all warm-blooded animals including man. Their presence may also indicate the presence of pathogenic bacteria and viruses. Coliform organisms originate not only in the excrement of warm-blooded animals but may also be found naturally in the soil. The use of the fecal coliform group as indicator organisms can further identify possible fecal contamination. The presence of fecal coliform organisms above safe levels indicate contamination with human or animal wastes which can contain organisms capable of causing disease in man. The water quality standards establish levels of total coliform densities which cannot be exceeded for particular water uses.

There are no criteria in the standards for levels of fecal coliform concentrations. The report by the National Technical Advisory Committee to the Secretary of the Interior on Water Quality Criteria indicates, however, that detectable health effects may occur in recreational waters where the fecal coliform level is above 400 per 100 milliliters (ml).

Shellfish contaminated by pathogenic bacteria which are eaten raw or after improper cooking result in disease and illness. The National Shellfish Sanitation Program administered under the Food and Drug Administration was established to control such disease transmission. State and Federal governmental agencies as well as industry participate in this program of preserving and managing shellfish resources. Through the program, in which New York and Connecticut are members, guidelines for proper sanitary quality of waters approved for shellfish harvesting have been established.

Approval or condemnation of a shellfish area is based upon:

1. Amount of dilution water available,
2. Hydrographic conditions,
3. Presence of sources of pollution which might discharge fecal material, radionuclides, pesticides and chemical wastes,
4. Possible pollution sources, such as toilet discharges from boats directly over shellfish beds,
5. Lack of knowledge of the above factors pending sanitary surveys,
6. Bacteriological data, with samples collected under the worst hydrographic conditions. Bacteriologic limits included in the approved water quality standards require that the total coliform count be less than 70 MPN (most probable number) organisms per 100 ml.

Nutrients are necessary to the growth of algae and aquatic plants. When other environmental conditions such as temperature, sunlight and salinity are satisfactory, nutrients such as nitrogen and phosphorus

TABLE 6

WATER QUALITY STANDARDS VIOLATIONS IN LONG ISLAND SOUND AS DETERMINED BY EPA SURVEYS OF SEPTEMBER-OCTOBER 1969 AND JULY 1970

Location	Water Quality[1/] Classification	Year Of Survey	Standards D.O.	Violation Coliform
AREAS OF SERIOUS DEGRADATION[2/]				
East River	SB	1969-70	X	X
Off Stepping Stones	SB	1969-70	X	X
Off Hewlett Point	SB	1969-70	X	X
Eastchester Bay	SB	1970	X	X
Hutchinson River	SB	1970	X	X
Little Neck Bay	SB	1969		X
Manyasset Bay	SA	1969		X
Off Peningo Neck	SA	1969-70		X
Port Chester Harbor	SB	1969-70		X
Greenwich Harbor	SB	1969		X
Stamford Harbor	SB	1969-70		X
Norwalk Harbor	SC	1970	X	
Bridgeport Harbor	SB,SC	1969		X
Housatonic River	SA,SB	1970	X	X
Milford Harbor	SB	1970	X	
New Haven Harbor	SA,SB,SC	1969-70	X	X
New London Harbor	SB	1970		X
Thames River	SB	1970	X	X
AREAS OF MARGINAL WATER QUALITY[3/]				
New Rochelle Outfall	SB	1969		X
Larchmont Harbor	SA	1969		X
Mamaroneck Outfall	SA,SB	1969-70		X
Blind Brook Outfall	SA	1970		X

[1/] See Appendix D for the criteria pertaining to the water quality classification.

[2/] Criteria used for establishing the areas of Serious Degradation include:

DO level below standard on one or more occasions.
Coliform equal to or above median value on two occasions.
Coliform density equal to or above 5000 MPN on one or more occasions.

[3/] Criteria used for establishing the areas of Marginal Water Quality indlude:

Coliform density above median value on only one occasion.
DO level equal to or only 0.1 mg/l above standards level.

TABLE 7

WATER QUALITY STANDARDS VIOLATIONS IN LONG ISLAND SOUND AS DETERMINED BY STATE, COUNTY AND INTERSTATE AGENCIES

Location	Water Quality Classification	Year of Survey or Report
East River	SB	1959,1970
Off Stepping Stones	SB	1969,1970
Off Sands Point	SA	1969,1970
Off Hewlett Point	SA	1970
Little Neck Bay	SB	1970
Hempstead Harbor	SA	1969,1970
Oyster Bay	SA	1969,1970
Cold Spring Harbor	SA	1969,1970
Port Jefferson Harbor	SA	1966-1969
Huntington - Northport Harbor	SA	
Off Peningo Neck (Porgy Shoal)	SA	1967-1970
Mamaroneck Harbor	SA	1967-1970
Larchmont Harbor	SA	1967-1970
Off Port Chester Harbor	SA	1967-1970
Housatonic River (from mouth to Derby Dam)	SB	1970
Connecticut River (from mouth to Hurd State Park)	SB	1970
Byram River (from mouth to tide water)	SC	1970
Stamford Harbor - East Branch inside barrier	SC	1970
Norwalk Harbor - inside Calfgastan Point	SC	1970
Ash Creek, Black Rock Harbor	SC	1970
Bridgeport Harbor	SC	1970
Tidewater inside Bridgeport Shellfish line	SB	1970
New Haven Harbor	SC,SB	1970
Mill River	SC	1970
Quinnipiac River	SC	1970
Mystic River - inside Shellfish line	SB	1970
Stonington - inside Shellfish line	SA	1970

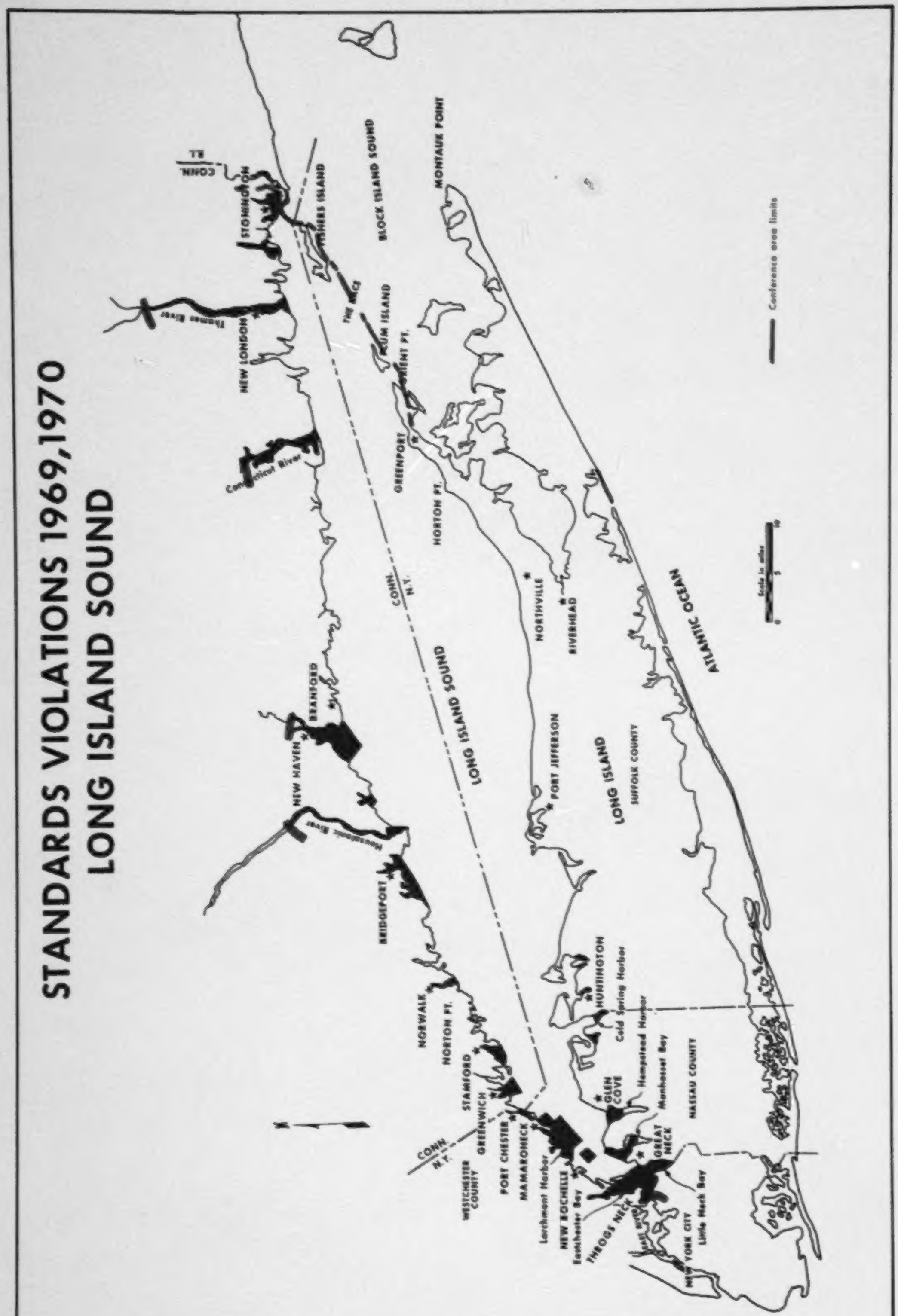

STANDARDS VIOLATIONS 1969,1970
LONG ISLAND SOUND
CONN.
R.I.
STONINGTON
FISHERS ISLAND
BLOCK ISLAND SOUND
MONTAUK POINT
Thames River
NEW LONDON
THE RACE
PLUM ISLAND
ORIENT PT.
GREENPORT
Connecticut River
HORTON PT.
CONN.
N.Y.
NORTHVILLE
RIVERHEAD
ATLANTIC OCEAN
BRANFORD
NEW HAVEN
LONG ISLAND SOUND
PORT JEFFERSON
LONG ISLAND
SUFFOLK COUNTY
Housatonic River
BRIDGEPORT
HUNTINGTON
Cold Spring Harbor
NORWALK
NORTON PT.
STAMFORD
GREENWICH
GLEN COVE
Hempstead Harbor
Manhasset Bay
NASSAU COUNTY
CONN.
N.Y.
WESTCHESTER COUNTY
PORT CHESTER
MAMARONECK
Larchmont Harbor
NEW ROCHELLE
Eastchester Bay
THROGS NECK
GREAT NECK
EAST RIVER
NEW YORK CITY
Little Neck Bay
Scale in miles
0
5
10
Conference area limits

Figure 5

19 c

become critical restraining growth factors. Low concentrations of phosphorous and nitrogen will support algal growth. Algal growth in limited quantities is desirable as a necessary link in the aquatic food chain. Enrichment of the receiving water with nutrients can cause excessive algal growths to occur which renders the water unsightly with accompanying obnoxious odors and reduced dissolved oxygen levels.

Water Quality in 1969

The results of the survey conducted by the EPA in 1969 show that the open waters of the Sound, from the New York City - Nassau County line in the west to The Race, near Fishers Island in the east, (1969 stations 5-23) are of good quality. Temperatures throughout the Sound ranged from 17.8°C to 20.2°C. Thermal stratification was not detected although slightly lower temperatures were found in the deeper waters. Surface dissolved oxygen concentrations ranged from 6.4 to 7.8 mg/l (84 to 100 percent saturation). Dissolved oxygen concentrations (due mainly to the higher salinity) were five to ten percent lower in the deeper water than near the surface. Total and fecal coliform levels were generally less than ten organisms per 100 ml except at the extreme western end near the New York City - Nassau County line, where the level approached 300 total coliform organisms per 100 ml. Concentrations of total phosphorous ranged from a high of 0.26 mg/l in the western end to 0.03 mg/l in the eastern end. Nitrate concentrations ranged from 0.19 to 0.06 mg/l. Chlorophyll a ranged from a high of 14.5 mg/m^3 (milligrams per cubic meter) to a low of 2.6 mg/m^3.

Over the past 15 years, state, county, interstate and local agencies have conducted extensive water quality surveys in selected portions of Long Island Sound. Generally, the results of these studies were similar to those found during the EPA survey of 1969.

Western Long Island Sound - Upper East River

Water quality in the west end of the Sound and the adjacent waters of the East River (1969 stations 1-4, 24, 25, 35 and 36) indicated that violations of the approved water quality standards occurred during the fall 1969 survey. The data showed that quality of the water improves from west to east with the lowest water quality existing in the East River. Dissolved oxygen levels for all the stations in this section ranged from 4.6 mg/l in the East River to 8.0 mg/l near Orchard Beach. Dissolved oxygen at two locations (Whitestone Bridge in the East River and Throgs Neck in the Sound) were below the required concentration of 5.0 mg/l. Total coliform bacterial levels ranged from 27,000 organisms per 100 ml in the East River to 150 organisms per 100 ml near City Island. Four locations contained coliform densities greater than the monthly median value of 2,400 per 100 ml established by the standards. These stations were in the East River, Long Island Sound at Throgs Neck Bridge, near Stepping Stones and in Little Neck Bay. Fecal coliform levels at these locations were greater than the level recommended by the National

Technical Advisory Committee, suggesting contamination from inadequately treated wastes and a possible health hazard to people swimming or boating in the area. Nutrient concentrations were generally higher than those found in other areas of the Sound. Phosphorous concentrations ranged 0.36 mg/l to 0.19 mg/l while nitrate levels varied from 0.25 to 0.19 mg/l. These water quality conditions indicate the effect of waste sources originating from the metropolitan New York City area.

The Nassau County Department of Health has carried out extensive bacteriological studies along the beaches and in the harbors on the north shore of Nassau County. The results of its 1969 studies indicate that total coliform levels in the western end of the Sound and in several harbors were in violation of the established standards for Class SB and SA waters respectively. Based upon five or more samples collected monthly, median values for total coliform per 100 ml exceeding permissible levels were found at Stepping Stones and Sands Point in the Sound and in Little Neck and Manhasset Bays.

In the summer of 1959, the Interstate Sanitation Commission conducted a water pollution survey of the East River and the western end of Long Island Sound. That survey revealed that in the upper East River and west end of Long Island Sound mean percent saturation of dissolved oxygen was generally below the required 50 percent of saturation. Total coliform values found at the majority of stations were greater than 2,400 per 100 ml. It was expected at that time that the new chlorination facilities at the New York City Tallmans Island waste treatment plant would reduce the coliform density in the upper East River - western Long Island Sound area. The study also indicated that pollution from the upper East River can move through Throgs Neck to Stepping Stones Beach.

Southern Shore

Along the southern shoreline from the entrance of Hempstead Harbor to Fishers Island (1969 stations 26 to 34), dissolved oxygen concentrations were greater than 100 percent saturation at four locations and not less than 90 percent at any location. Total coliform levels were less than four per 100 ml except in Port Jefferson Harbor and near Inlet Point where levels were 50 per 100 ml and 22 per 100 ml, respectively. Fecal coliform levels were all less than eight per 100 milliliters. Phosphorous concentrations declined from west to east (0.23 to 0.03 mg/l) and nitrate concentrations showed the same general trend (0.22 to 0.07 mg/l). Chlorophyll a levels, a measure of the concentration of phytoplankton (microscopic green plants), were about twice those of the open Sound waters, reaching a high of 19.7 mg per cubic meter.

The 1969 Nassau County Department of Health studies indicate that median densities of total coliform per 100 ml were in violation of permissible values in portions of Hempstead Harbor and Oyster Bay.

Studies conducted by the New York State Department of Environmental Conservation during 1966-1969 reveal that water quality problems restrict the permissible use (namely shellfishing for market purposes) in Oyster

Bay, Cold Spring Harbor, Port Jefferson Harbor and Huntington - Northport Harbor. In these waters, total coliform densities require that certain areas be closed to the harvesting of shellfish.

Westchester County Shore

Along the shoreline of Westchester County (1969, stations 37-43) total coliform levels ranged from less than eight organisms per 100 ml to 4,000 organisms per 100 ml. At three of the seven station locations, the coliform levels were greater than the established standard for contact recreation. These locations were near the New Rochelle and Mamaroneck outfalls and off Peningo Neck. In Larchmont Harbor, the extremely high chlorophyll a (52.1 milligram per cubic meter) suggests an abundant growth of phytoplankton.

Port Chester Harbor

Port Chester Harbor, including a one and one half mile tidal section of the Byram River, forms part of the boundary between New York and Connecticut. The EPA survey of 1969 (Stations 44 and 45) and an earlier survey in September 1968 showed that the quality of these waters violate the approved standards. In 1969, the sample collected in the Harbor contained a total coliform level of 14,000 per 100 ml and a fecal level of 2,100 per 100 ml. Another station sampled in the open surface waters adjacent to the Harbor near Bluefish Shoal (classified for commercial harvesting of shellfish) contained a total coliform density of 100 per 100 ml.

In 1968, EPA conducted a separate study of the interstate waters of the Byram River Basin. The results of the survey showed that in the one and one-half mile tidal stretch dissolved oxygen ranged from a low of 0.9 mg/l up to and above the water quality standards established by New York and Connecticut. Total and fecal coliform levels in the stretch indicate that inadequately treated municipal wastes enter these waters. In the tidal portion of the Byram River, the water was visibly polluted by oil and suspended matter. A distinct oily odor filled the air and the banks were coated with oil. Gas bubbles were surfacing at several locations. The bottom in this stretch of the Byram River was found to consist primarily of ooze saturated with oil and which released a slight hydrogen sulfide odor. Benthic life was typical of a degraded water. The Byram River forms the interstate boundary between New York and Connecticut. Interstate pollution occurs in the Byram River and these waters eventually enter the Harbor and Sound creating interstate pollution problems there too.

Connecticut Shore

Along the Connecticut shore (1969 stations 46-59), from Port Chester Harbor to New Haven Harbor, dissolved oxygen concentrations ranged from 5.1 to 9.6 mg/l (64 percent - 120 percent saturation). Bacterial densities varied from four per 100 ml to greater than 30,000 per 100 ml for total coliform and two per 100 ml to 9,800 per 100 ml for fecal coliform.

Problem areas along the western Connecticut shore were found in the waters in or adjacent to the highly urbanized harbors of Greenwich, Bridgeport and Stamford. In these harbors, total coliform densities far exceeded the median level established by the standards. The high density of fecal coliforms suggest gross pollution from inadequately treated municipal wastes and represent a potential health hazard to those using these waters for recreation.

New Haven Harbor

Two stations (1969 stations 60-61) were sampled in New Haven Harbor. One sample was taken in the Harbor while the other was taken at the breakwater in Long Island Sound. The analytical data suggest dissolved oxygen and bacterial problems. Dissolved oxygen measured at 4.0 mg/l. In the Harbor, total and fecal coliform densities were greater than 100,000 and 36,000 per 100 ml respectively, indicating gross pollution from human wastes. In the Outer Harbor, total and fecal coliform counts were still above the standards although reduced to less than 3,000 and 300, respectively.

In September and October 1967, EPA conducted a microbiological and biological study of New Haven Harbor. These surveys confirmed that pollution problems exist in the Harbor. The data also showed the effect of discontinuing chlorination of the four water pollution control plant effluents. Chlorination was being carried out in September, but not during the October surveys. During disinfection, average maximum total coliform levels in the Harbor ranged from 220 to 17,200 per 100 ml while during the period in which disinfection was discontinued total maximum coliform densities showed much higher levels ranging from 1,410 to 348,000 per 100 ml. Average maximum fecal coliform levels during the surveys varied from 80 to greater than 16,000 per 100 ml with disinfection and from 790 to 92,000 per 100 ml after chlorination was terminated.

At and beyond the breakwater system, the data again showed marked reduction in coliforms. Average maximum total coliform levels were less than 230 per 100 ml, but greater than the established safe level of 70 per 100 ml for shellfishing. Analysis of water samples taken in the fall of 1967 in the vicinity of shellfish beds showed a direct relationship in the concentrations of coliforms found in the overlying waters and in shellfish. The data confirm the ability of the shellfish to concentrate contaminants in their meat.

The biological survey conducted in conjunction with the microbiological study consisted primarily of an examination of the benthic conditions underlying the Harbor waters. The results indicate the cumulative effect on the Harbor of inadequately treated municipal and industrial wastes, oil seepage from oil storage facilities and ships, and pollutants originating from the Mill and Quinnipiac Rivers. The upper Harbor area, comprising eight percent of the total Harbor area (from Mill and Quinnipiac Rivers to City Point) was found grossly polluted from a biological standpoint. Sludge deposits exceeding six inches in depth were prevalent throughout the area. The benthic population, extremely limited in numbers and species, consisted only of worms and snails. Strong septic, hydrogen sulfide odors were observed in all bottom samples, suggesting extensive anaerobic decomposition.

In the remaining portion of the Harbor from City Point to the breakwater sludge depths of two to five inches were observed. Foul smelling odors caused by anaerobic decomposition were again prevalent in the bottom samples.

Bottom samples outside the breakwater reflected clean unpolluted water. There were generally no sludge buildups or detectable odors of decomposition found at the various stations sampled. Benthic species indicated a wide diversity of life, such as would be found in a clean water environment.

New London Harbor

Water quality in New London Harbor during the September - October 1969 survey (stations 68-69) indicated a marginal dissolved oxygen and bacterial condition. The dissolved oxygen (5.1 mg/l) was slightly greater than the 5.0 mg/l established by the standards. Fecal coliform densities were also high (1,200 per 100 ml).

Water Quality in 1970

Previous data and the 1969 Environmental Protection Agency survey of the open waters of Long Island Sound showed sufficient areas of degraded water quality to warrant more extensive and detailed study. Accordingly, the EPA, The Interstate Sanitation Commission, the Nassau and Westchester County Health Departments, and the State University of New York agreed to conduct a more detailed cooperative study during 1970. Each agency concentrated its activities on different portions of the Sound. The results of the 1970 EPA Survey, which was conducted along the north shore of the Sound, support the findings in 1969 and reveal new areas of water quality standards violation. These results are summarized in Table 6 and Figure 5 and are discussed in the following paragraphs.

Western Long Island Sound

Water quality standards violations were found in the western end of Long Island Sound (1970 stations 1-6, 2A). Dissolved oxygen levels ranged from 0.6 mg/l in the Hutchinson River to 6.5 mg/l near Orchard Beach. Total coliform densities ranged from 35,000 organisms per 100 ml at Throgs Neck to 79 organisms per 100 ml near Orchard Beach.

Fecal coliform densities ranged from 11,000 to 33 organisms per 100 ml. These bacterial concentrations were 2-10 times those observed in 1969.

Water quality failed to meet the dissolved oxygen and bacterial criteria at Throgs Neck, East Chester Bay and in the open waters off Great Neck (Stepping Stones and Hewlett Point). Total coliform densities from Throgs Neck to Orchard Beach were 2-1/2 times the monthly median value of 2,400 organisms per 100 ml established by the standards. The high fecal coliform densities indicate recent contamination by inadequately treated human or animal feces. The nutrient data indicate high levels of enrichment. Total phosphorus (range: 0.18-0.52 mg/l) and nitrate (range: 0.09-0.18 mg/l) concentrations were 2-10 times levels elsewhere in the Sound.

Extremely low dissolved oxygen levels and high coliform densities indicate gross contamination of the upper Hutchinson River. Combined sewer overflow may represent a source of this contamination. During the survey, extensive floating trash and heavy recreational use were observed in this area. The high fecal coliform density represents a definite hazard to recreational use.

A study conducted by the Interstate Sanitation Commission during July 28 - August 14, 1970 in the Upper East River and Western Long Island Sound showed violations of the approved standards. Interstate Sanitation Commission results indicate that, although dissolved oxygen has increased since the 1959 study mentioned earlier, levels in the Upper East River and the adjacent waters of Long Island Sound were below the standards of 5.0 mg/l. Saturation levels were below 50 percent. Coliform densities in these waters were found to exceed the limits established by the Standards with geometric mean ranging from 56,690 MPN per 100 ml in the East River to less than 100 MPN per 100 ml in Western Long Island. These coliform densities were noticeably higher than those found during the 1959 survey.

Westchester County Shore

Standards violations continued along the shore line of Westchester County (1970 stations 7-15, 9A, 10A) from New Rochelle to Port Chester Harbor. Dissolved oxygen levels ranged from 5.3 mg/l adjacent to the Mamaroneck sewage outfall to 9.8 mg/l in Larchmont Harbor. Dissolved oxygen concentrations were below acceptable levels in the Class SA waters adjacent to the Mamaroneck and Blind Brook sewage outfalls. Total coliform densities ranged from 2,400 organisms per 100 ml in Port Chester Harbor to 33 organisms per 100 ml at the entrance to Larchmont Harbor. Total coliform densities exceeded the established levels at these locations and in Port Chester Harbor. Fecal coliform densities ranged from 13 to 230 organisms per 100 ml. Chlorophyll a concentrations were noticeably higher in Larchmont and Mamaroneck Harbors than in the open Sound waters.

Standards were violated in Port Chester Harbor in 1970. The total coliform density at the entrance to the Byram River was 2,400 organisms per 100 ml. Extensive floating trash, aquatic plant growth, and a slight oil slick were observed.

A comprehensive study was conducted by the New York State Department of Environmental Conservation during 1969-1970 of the waters of Long Island Sound in Westchester County. The results of the study indicated an improvement in water quality in the waters generally west of Mamaroneck Harbor. It showed that the area northeast of Mamaroneck Harbor continued to contain high densities of coliform organisms.

Connecticut Shore

Samples were collected at 43 locations along the Connecticut shore from Port Chester Harbor to New Haven Harbor (1970 stations 16-58, 45A). Dissolved oxygen ranged from 3.8 mg/l in Norwalk Harbor to 10.3 mg/l off Smith Reef (near Stamford). Total coliform density ranged from 2 organisms per 100 ml at several locations to greater than 24,000 organisms per 100 ml on the Housatonic River. Fecal coliform densities ranged from 2 to 5,400 organisms per 100 ml.

Approved coliform and dissolved oxygen standards were violated in Stamford Harbor, Norwalk Harbor, the Housatonic River, and Milford Harbor. In the Housatonic River, dissolved oxygen concentrations were below the established limit of 5.0 mg/l at three of the five stations sampled. Total coliform densities were also greater than the established standards at three locations. The maximum total coliform level of 24,000 organisms per 100 ml was found at two upstream stations. Fecal coliform densities were also significantly high at these stations. These low dissolved oxygen levels and high densities of total and fecal coliform organisms (24,000 and 5,400 organisms per 100 ml, respectively), suggest that the Housatonic River receives discharges of inadequately treated municipal waste. The area of water quality degradation includes both the river itself and the area adjacent to its mouth.

Dissolved oxygen levels were also depressed in Norwalk (3.8 mg/l), and Milford Harbors (5.3 mg/l). High total and fecal coliform densities (4,900 and 490 organisms per 100 ml, respectively) were observed in Stamford Harbor.

Chlorophyll a concentrations were noticeably higher in Cos Cob, Stamford, Sheffield, Norwalk, Southport, Black Rock, and Bridgeport Harbors and the upper Housatonic River when compared to the offshore waters. These levels suggest the presence of abundant phytoplankton or plant growth.

A 1970 report by the Water Resources Commission, State of Connecticut on Water Quality Standards lists those waters where present quality is below the adopted standards. The report, which confirms the results of the 1970 Environmental Protection Agency survey, indicates that problems of quality exist in: Connecticut River, Housatonic River, Byram River, Stamford Harbor, Norwalk Harbor, Black Rock Harbor, Bridgeport Harbor, New Haven Harbor, Mill River and Quinnipiac River, Mystic River and Stonington.

New Haven Harbor

New Haven Harbor (1970 stations 59-69) continues to exhibit poor water quality. The water quality standards were violated at six of the 11 locations sampled. Water quality at five of the six stations in the inner harbor (classified SC) failed to meet criteria established for dissolved oxygen and bacteria. Dissolved oxygen levels varied from 1.4 to 4.2 mg/l. Total and fecal coliform densities ranged from 3,300 to 24,000 and 350 to 5,400 organisms per 100 ml, respectively. Water quality standards were not violated in the outer harbor (classified SB). Dissolved oxygen concentrations ranged from 5.5 to 6.1 mg/l. Total coliform densities ranged from 23 to 220 organisms per 100 ml. However, dissolved oxygen was below acceptable levels outside the breakwater at the harbor entrance (classified SA).

Chlorophyll a concentrations exceeded 10 milligrams per cubic meter at 4 of 6 locations in the inner harbor and reached a maximum of 17.1 mg/m^3. These levels suggest abundant phytoplankton growth.

Branford to Connecticut-Rhode Island State Line (excluding Thames River)

From Branford to the Connecticut-Rhode Island State line shoreline (1970 stations 70-91, 106-116) waters excluding the Thames River were of high quality. Approved standards were not violated in this area during the survey. The mean dissolved oxygen concentration in these waters was 7.8 mg/l. Total coliform densities ranged from less than 2 organisms per 100 ml to 540 organisms per 100 ml in Mystic and Stonington Harbors. Fecal coliform densities were generally less than 30 organisms per 100 ml.

Chlorophyll a and nutrient concentrations and bacterial densities were much lower than those in urbanized areas west of New Haven Harbor. Chlorophyll a concentrations were higher than background levels in the Connecticut River and Mystic and Stonington Harbors.

New London Harbor-Thames River

Water quality standards were violated at seven of 13 locations in the New London Harbor-Thames River complex (1970 stations 92-105). Dissolved oxygen levels ranged from 4.2 to 8.6 mg/l. Both total and fecal coliform densities ranged from 33 to greater than 24,000 organisms per 100 ml. Bacterial densities were higher than acceptable levels at five locations upstream from the Route 95 bridge. Four of these locations also exhibited total coliform densities greater than 24,000 organisms per 100 ml. These high total and fecal coliform densities -- exceeded only in the western Long Island Sound - East River area -- represent a definite hazard to recreational use.

Biology

In the balanced biological system of Long Island Sound sunlight and nutrients foster the growth of microscopic aquatic plants, the grass of the sea. These microscopic plants are consumed by the microscopic animals, clams, oysters, shrimps and small fish. Larger fish feed upon the smaller and waste from all these organisms is broken down by bacteria into the nutrients which start the cycle anew. It is becoming apparent that all portions of this complex biological cycle are now undergoing change.

The results of the EPA surveys of Long Island Sound in 1969 and 1970 showed that nutrients and chlorophyll a concentrations varied: for phosphorous, 0.52 - <0.01 mg/l; nitrate 0.47 - 0.01 mg/l, Total Kjeldahl nitrogen, 3.66 - 0.1 mg/l and chlorophyll a 88.8 - 1.0 milligrams per cubic meter. Phosphorous and nitrogen generally decreased toward the east. Chlorophyll a, a measure of primary production of plant life, also followed this same pattern. Riley, 1959, found phosphate and nitrate concentrations in Long Island Sound to decrease from west to east. He also found a seven-fold decrease in the chlorophyll concentration per unit volume between the western and eastern end of the Sound. Harris, 1959, observed maximum levels of all fractions of nitrogen in the western end of the Sound. Riley, 1941, observed chlorophyll a concentrations ranging from 5.2 - 62.0 mg/m^3. He found these values much higher than the oceanic waters outside the Sound. Nutrients, particularly phosphorous were also higher.

The EPA surveys indicate that nutrients and chlorophyll levels were generally higher near the population centers. Specifically, the western end of the Sound and embayments such as Oyster Bay in New York and Stamford, Southport, Bridgeport and New Haven Harbors in Connecticut had nutrient levels and quantities of floating aquatic plants noticeably higher than other areas of the Sound. These extensive growths of aquatic plants may occur only sporadically (e.g., New Haven Harbor, 1969) but the history of their occurrence dates back to the early 1950's. If the incoming load of nutrients continues to increase, the incidence of these nuisance conditions will multiply. It is then that the water will become green, the profusion of rooted and floating plants will interfere with swimming, boating, and fishing, and periodic high tides will leave the beaches covered with decaying marine plants which produce obnoxious odors. If those conditions are permitted to continue, the reversal of the downward trend will be questionable, and extremely costly.

The study of nutrient enrichment is an area which requires extensive and careful evaluation. The causes of problems produced by extensive aquatic growth are far more complex than a simple review of nitrogen, phosphorous and chlorophyll concentrations alone. Research, particularly in the marine environment is a definite need.

Summary

The water quality picture of Long Island Sound which has been presented is a reproduction of what has happened before at other places in other times. The quality of portions of the Sound are deteriorated to levels below the adopted standards. These conditions which are now occurring in the Sound are occurring by default rather than by design and to follow that path is to invite ecologic disaster and the loss of a valuable natural resource.

This natural system can be well managed and an ecologic balance restored -- it is not too late. A major effort toward this end has been initiated by the States of Connecticut and New York and these efforts are described in the next section. This effort, primarily aimed at the construction of upgraded and expanded water pollution control facilities, will provide the prompt action needed to abate pollution in areas of presently degraded water quality and prevent the spread of degradation to areas which are now of good quality. The formulation of a comprehensive water resource management program might well represent a rational plan which can ensure the future development of the Long Island Sound Region while protecting the quality of its waters.

V - POLLUTION CONTROL PROGRAMS

Federal

Water Quality Standards

The Water Quality Act of 1965 amended the Federal Water Pollution Control Act and provided for the establishment of water quality standards for interstate waters. Under the provisions of the Act, the states were given the option of setting water quality standards by June 30, 1967, for interstate waters or portions thereof within their borders and coastal waters. The standards were to be consistent with the purposes of the Act which are "...to enhance the quality and value of our water resources and to establish a national policy for the prevention, control and abatement of water pollution."

The Standards adopted by the States include a classification of water uses, water quality criteria for these uses and a plan for the implementation and enforcement of the water quality criteria adopted. The standards shall protect the public health or welfare, enhance the quality of the water and serve the purposes of the Act. In establishing standards, consideration was to be given to their use and value for public water supply, propagation of fish and wildlife, recreation, agriculture, industrial and other legitimate uses.

The standards adopted by New York and Connecticut were approved by the Administrator of EPA. Since the Administrator has determined that they are consistent with the provisions of the Act, they are Federal water quality standards applicable to those interstate waters. Appendix D contains a definition of best water usage and its appropriate water quality criteria pertinent to the waters of Long Island Sound.

Construction Grants

In the Long Island Sound Area, to date, EPA has spent or allocated $11,500,331 in Federal Grants to assist in the construction of 58 water pollution control projects having a total eligible cost of $142,615,317. Fifteen projects are in New York and 43 are in Connecticut. Table 8 lists these projects.

Federal Facilities

Federal agencies are charged by the President and the Congress to provide leadership for the nationwide pollution abatement program. Executive Order 11507 issued by the President February 4, 1970, declares: "It is the intent of this Order that the Federal government in the design, operation and maintenance of its facilities shall provide leadership in the nation with effort to protect and enhance the quality of our air and water resources." Actions necessary to meet the requirements of the

Executive Order are to be completed or under way by December 31, 1972, except where enforcement conferences or water quality standards require earlier actions, in which case the earliest date must be met. Section 21 of the Federal Water Quality Improvement Act of 1970 requires, among other things, that: "Each Federal agency (...includes Federal departments, agencies and instrumentalities) having jurisdiction over any real property or facility or engaged in any Federal public works activity of any kind, shall, consistent with the paramount interest of the United States as determined by the President, insure compliance with applicable water quality standards and the purpose of this Act in the administration of such property, facility or activity."

Federal activities have been instructed to program for needed improvements in order that requests may be submitted to the Congress for the appropriations needed to meet the compliance dates. Specific details for each of the Federal facilities located on Long Island Sound are listed in Appendix B.

State

New York

The New York Water Pollution Control Act of 1949 established a program of stream classifications for designated waters of the State. In response to the Federal Water Quality Act of 1965, New York was one of the first states in the nation to secure approval from the Federal government of quality standards for interstate waters. Appendix D presents the classifications and water quality criteria for Long Island Sound submitted to the Secretary of the Interior by New York. Appendix Table B-1 and B-3 summarizes the implementation schedule for each identified waste source as established by New York State in order to achieve compliance with the standards. Also listed are those waste sources which, in accordance with the standards, have ordered or voluntary implementation dates not specified but fall within the Pure Waters Program ending date of March 31, 1972. According to these schedules, there are five industrial facilities identified as sources of pollution. A breakdown of the compliance status is as follows: one is on schedule; one is behind schedule; one has a pending completion date (with no interim date); and two have no established schedule at this time. Of the 22 municipal waste sources that are identified: one is completed; three are behind schedule; three have pending interim dates; 11 have pending completion dates (with no interim dates) and four presently provide adequate treatment with no established schedule.

The New York State Legislature, in 1966, passed into law Section 33 of the Navigation Law. This section which became effective March 1, 1970 regulates the disposal from vessels of sewage and litter into the waterways of the State. Administrative Rules and Regulations promulgated in conformance with the laws prohibit the discharge of all wastes without complete treatment. Holding tanks, incineration and anaerobic digesters are some of the treatment methods permitted under the law. Effective implementation of Section 33 will protect Long Island Sound from the discharge of wastes from watercraft.

TABLE 8

FEDERAL CONSTRUCTION GRANT PROJECTS

LONG ISLAND SOUND

Name of Project	Project No.	Eligible Costs	Grant Amount	Date of Grant	Description[1]	Status[2]
		NEW YORK[3]				
Belgrave S. D.	190	$ 400,000	$ 120,000	1-63	STP (A)	3
Glen Cove (C)	236	120,000	36,000	4-64	STP (A)	3
Glen Cove (C)	432	504,000	166,320	9-68	PS, FM, INT	2
Great Neck S. D.	84	975,000	250,000	8-59	STP (A)	3
Great Neck S. D.	289	1,138,943	375,851	7-66	STP (A), PS, FM	3
Great Neck (V)	341	265,000	87,450	3-67	STP (A)	2
North Hempstead (T)	609	366,600	120,990	4-70	STP (A)	1
Northport (V)	237	28,600	8,580	5-64	INT, PS, FM	2
Northport (V)	577	508,000	152,340	9-70	STP (A)	1
Oyster Bay S. D.	130	1,161,300	348,390	8-61	STP (A)	2
Port Chester (V)	67	916,300	250,000	9-58	STP (A)	3
Port Washington S. D.	351	637,000	191,100	8-67	STP (A)	2
Roslyn (V)	342	133,602	44,089	5-67	STP (A)	3
Westchester Co. (Blind Brook)	105	2,875,000	250,000	2-61	STP (A)	3
Westchester Co. (Mamaroneck)	218	5,020,000	1,506,000	6-63	STP (A)	2
		$ 15,049,345	$3,907,110			

TABLE 8 (Cont'd)

FEDERAL CONSTRUCTION GRANT PROJECTS

LONG ISLAND SOUND

Name of Project	Project No.	Eligible Costs	Grant Amount	Date of Grant	Description[1]	Status[2]
			CONNECTICUT[4]			
Ansonia, City of	63	$ 1,564,980	$ 516,440	6-67	STP	3
Ansonia, City of	91	2,103,000	50,000 (L)	11-68	STP (A)	2
Branford, S. A.	18	1,373,145	250,000	9-61	STP	3
Bridgeport, City of	28	29,815	8,940	6-63	STP (A)	3
Bridgeport, City of	98	11,540,000	50,000 (L)	8-69	STP (A)	2
Bridgeport, City of	99	15,725,000	1,500,000 (L)	8-69	STP (A)	2
Canaan Fire Dist.	81	418,500	10,000 (L)	6-68	STP, INT	2
Connecticut DPW	25	661,926	198,577	5-63	STP, INT	3
Conn. Health Dept.	76	239,000	6,000 (L)	12-68	STP	2
Derby, City of	50	915,000	250,000	11-65	STP, INT	3
East Haven, Town of	14	998,586	250,000	8-60	INT	3
East Haven, Town of	68	2,130,695	42,000 (L)	9-67	STP (A), INT	2
Fairfield, Town of	126	2,200,000	60,000 (L)	6-70	STP (A)	1
Fairfield, Town of	55	819,897	270,566	8-66	STP (A)	3

TABLE 8 (Cont'd)

FEDERAL CONSTRUCTION GRANT PROJECTS

LONG ISLAND SOUND

Name of Project	Project No.	Eligible Costs	Grant Amount	Date of Grant	Description[1/]	Status[2/]
		CONNECTICUT[4/] (Cont'd)				
Greenwich, Town of	21	$ 846,123	$ 250,000	7-62	INT	3
Greenwich, Town of	113	1,350,000	25,000 (L)	12-69	INT	2
Groton, Town of	61	339,000	111,870	2-67	STP (A), INT	2
Groton, Town of	136	13,615,000	100,000 (L)	11-70	STP, FM, PS	1
Groton, City of	104	3,544,000	50,000	8-69 (L)	STP (A)	2
Hamden, Town of	38	1,320,000	250,000	3-64	INT	3
Milford, City of	72	5,196,000	80,000	1-68 (L)	STP, O, INT	2
New Canaan, Town of	17	653,714	196,114	4-61	STP (A)	3
New Haven, City of	39	2,294,000	250,000	6-64	STP (A)	3
New Haven, City of	95	82,749	45,511	3-69	STP (A)	3
New London, City of	36	27,000	8,100	2-64	STP (A)	3
New London, City of	135	2,459,000	50,000 (L)	11-70	STP, PS, INT	1
North Haven, Town of	37	1,647,100	250,000	3-64	STP	3
North Haven, Town of	90	385,100	11,000	11-68 (L)	INT	2

TABLE 8 (Cont'd)

FEDERAL CONSTRUCTION GRANT PROJECTS

LONG ISLAND SOUND

Name of Project	Project No.	Eligible Costs	Grant Amount	Date of Grant	Description[1]	Status[2]
		CONNECTICUT[4] (Cont'd)				
Norwalk, City of	19	$ 127,677	$ 38,303	1-62	STP (A)	3
Norwalk, City of	42	1,692,000	558,360	10-64	STP (A)	2
Norwalk, City of	139	5,361,000	100,000 (L)	11-70	STP (A)	1
Norwich, City of	1	1,517,696	250,000	2-57	STP, INT, PS	3
Norwich, City of	26 (APW)	339,439	-	-	STP (A), FM	3
Norwich, City of	92	1,783,000	40,000	12-68 (L)	INT	2
Shelton, City of	46	970,450	250,000	1-65	STP, INT	3
Southington, Town of	5	1,031,080	250,000	8-57	STP	3
Stamford, City of	77	100,800	55,440	4-68	INT	2
Stamford, City of	103	2,109.500	52,000 (L)	7-69	INT	2
Stonington, Town of	120	3,842,000	50,000 (L)	4-70	STP, INT, PS	2
Stratford, Town of	124	15,450,000	100,000 (L)	5-70	STP, INT, PS, FM	1
West Haven, City of	64	5,039,000	400,000 (L)	8-67	STP, INT	2
West Haven, City of	131	12,665,000	100,000 (L)	8-70	STP (A), INT, PS, FM	1

TABLE 8 (Cont'd)

FEDERAL CONSTRUCTION GRANT PROJECTS

LONG ISLAND SOUND

Name of Project	Project No.	Eligible Costs	Grant Amount	Date of Grant	Description[1/]	Status[2/]
		CONNECTICUT[4/] (Cont'd)				
Westport, Town of	9	$ 1,059,000	$ 250,000	4-59	STP, O, INT	3
		$127,565,972	$7,634,221			

(L) Limited Federal Grant. State Prefinancing Remainder of Federal Share.

1/ Description of Project:

(A) - Additions and/or Alterations
FM - Force Main
INT - Intercepting Sewers
STP - Sewage Treatment Plant
O - Outfall Sewer

2/ Status:

1. Project Approved (Grant Offer Made)
2. Under Construction
3. Project Completed

3/ New York State provides a 30% State construction grant to communities to assist in the construction of Water Pollution Control Facilities. This program also provides for prefinancing of Federal grants, where necessary, up to 29% because the funding of the Federal program is far below needs. In 1965, a billion dollar bond issue was authorized to finance the State Grant Program.

4/ Bond Issues totalling $250 Million have been financed for matching construction grants funds of 30%. The law also provided for State prefinancing of the Federal share of the grant. Connecticut has prefinanced all major FY 69 and 70 projects with limited Federal Grants averaging 5% of Eligible Costs.

Connecticut

The Connecticut Water Resources Commission under Connecticut Public Act No. 57 approved May 1, 1967, has held five public hearings relative to the adoption of standards for the waters of the State and has adopted water quality standards for all interstate, intrastate and coastal waters. The standards applicable to interstate and coastal waters were approved by the Secretary of the Interior in his letter of February 15, 1968, with two exceptions. Revisions intended to overcome the exceptions along with other modifications were adopted by the Commission on November 17, 1969, and were approved by the Secretary on April 21, 1970.

To achieve compliance with the standards, the Commission has issued orders to all known polluters, both municipal and private. The orders are aimed at treating all sources of pollution through the installation of secondary treatment of the activated sludge type or its equivalent, except in cases where a higher degree of treatment will be required to maintain the water quality standards. The original state schedule provided for completion of all waste treatment facilities by the end of 1972. The Commission has, in some cases, modified original schedules after review of new information and special conditions. Appendix Table B-1 and B-3 summarizes the implementation schedule for identified waste sources as established by the State of Connecticut.

According to these schedules, 132 industrial facilities are identified as sources of industrial and/or domestic pollution. A breakdown of the compliance status is as follows: four are no longer discharging, 33 are on schedule; 79 are behind schedule; 10 have pending completion dates (with no interim dates); and six have no schedules established at this time. In addition, 17 facilities are required to abate domestic pollution as well as industrial discharges; namely by connection to a municipal system. A breakdown of the compliance status for these is as follows: one is no longer discharging, nine are on schedule, and seven are behind schedule. The municipal plants that have been identified total 38, of which six are on schedule, 26 are behind schedule; one has a pending completion date (with no interim date) and five presently provide adequate treatment with no established schedule.

Interstate Programs

Interstate Sanitation Commission

The Interstate Sanitation Commission was formed by the Tri-State Compact between the States of New Jersey, New York and Connecticut to have jurisdiction in the Interstate Sanitation District. This District consists of all coastal, estuarine and tidal waters within or covering the signatory states in an area which includes the New York Harbor complex and the waters of Long Island Sound from the East River to a line extending from the east side of New Haven Harbor on the Connecticut shore to the east side of Port Jefferson Harbor on the New York shore.

The Commission has the power to make rules, regulations and issue orders with regard to pollution and to determine the adequacy of treatment provided by wastewater facilities. It carries out a program of surveillance and, when necessary, can resort to the courts to compel enforcement. The Commission endeavors to convince municipalities and industries of the need for voluntary and cooperative abatement measures before it considers enforcement action.

The Commission exhibits its regional leadership in numerous ways. It has made substantial progress toward the enactment of legislation which will enable the Commission to place in force, through appropriate steps, improved classification of waters and effluent standards. Presently, the Commission performs the valuable role of facilitating the development of uniform standards and regulations. Surveillance of water quality is carried out throughout the Commission's jurisdiction by means of sampling and analysis on routine boat runs as well as more intensive studies in selected areas. The Commission also conducts an extensive waste sampling program and develops programs for the training of treatment plant operators.

New England River Basins Commission

The New England River Basins Commission is a federal-state commission composed of representatives of the six New England States and New York, eight Federal agencies and six interstate agencies. Established in September 1967 under the Water Resources Planning Act, the Commission is charged with: a) serving as the principal agency for coordination of all plans for water and related land resources; b) preparing and updating a comprehensive, coordinated joint plan for water and related land resources; and c) recommending schedules of priorities for water resources programs. Special studies and projects related to these purposes have been conducted. A recent Presidential Executive Order (Order No. 11528, dated April 24, 1970) extended the jurisdiction of the Commission to include Long Island Sound except the portion lying west of a line extended from the Connecticut - New York boundary at the northern shore of the Sound to the New York City - Nassau County boundary on the southern shore of the Sound.

The Commission provides leadership in a cooperative Federal, State and local comprehensive plan for the waters and related land resources of Long Island Sound, initiated in 1971 under the Water Resources Planning Act.

New England Interstate Water Pollution Control Commission

Comprising the six New England States and the State of New York, the New England Interstate Water Pollution Control Commission was established by interstate compact in 1947. The Commission provides a vehicle for interstate cooperation in water pollution control through the classification of interstate streams, research on regional water pollution control problems and public information. Recently, it has directed its attention to programs providing training for waste treatment plant operators.

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APPENDIX A

CONVENTIONAL STEAM AND NUCLEAR ELECTRIC POWER PLANTS ON LONG ISLAND SOUND

TABLE A-1

CONVENTIONAL STEAM ELECTRIC POWER PLANTS ON LONG ISLAND SOUND[1/]

Map No.	Name of Plant and Location	Installed Capacity (Megawatts) 1967	Planned Capacity[2/] (Megawatts) 1970	Planned Capacity[2/] (Megawatts) 1990
1	Long Island Lighting Company Port Jefferson Port Jefferson, Long Island	467	483	483
2	Long Island Lighting Company Northport Northport, Long Island	387	403	403
3	Long Island Lighting Company Glenwood Landing, Hempstead Harbor Glenwood Landing, Long Island	307	1567	1567
4	New York, New Haven & Hartford Railroad Cos Cob Cos Cob, Connecticut	27		
5	Hartford Electric Light Company Stamford Stamford, Connecticut	52		
6	Connecticut Light & Power Company Norwalk Harbor Norwalk, Connecticut	326		
7	General Electric Company Bridgeport Bridgeport, Connecticut	15		
8	United Illuminating Company Steep Point Bridgeport, Connecticut	156		
9	United Illuminating Company Bridgeport Harbor Bridgeport, Connecticut	261	655	1155
10	Connecticut Light & Power Company Devon, Housatonic River Devon, Connecticut	479	470	445

[1/] See Figure A-1 for location of power plants.
[2/] Recent controversies regarding thermal pollution have delayed construction of many planned stations.

TABLE A-1 (Cont'd)

CONVENTIONAL STEAM ELECTRIC POWER PLANTS ON LONG ISLAND SOUND

Map No.	Name of Plant and Location	Installed Capacity (Megawatts) 1967	Planned Capacity (Megawatts) 1970	1990
11	United Illuminating Company Derby, Housatonic River Derby, Connecticut	20		
12	United Illuminating Company English, Mill River New Haven, Connecticut	146		
13	Yale University Sterling New Haven, Connecticut	1.7		
14	Yale University Central New Haven, Connecticut	3.4		
15	United States Navy New London Sub Base New London, Connecticut	7		
16	Connecticut Light & Power Company Montville, Thames River New London, Connecticut	176	176	554
17	Charles Pfizer & Company Groton, Thames River Groton, Connecticut	11		

TABLE A-2

NUCLEAR ELECTRIC POWER PLANTS ON LONG ISLAND SOUND[1/]

Map No.	Name of Plant and Location	Proposed Capacity (Megawatts)	Scheduled Completion Date
1	Long Island Lighting Company Shoreham Shoreham, Long Island, New York	849	1975
2	Long Island Lighting Company Lloyd Neck Lloyd Harbor, New York	1000	Mid 1980's
3	Consolidated Edison Company Welfare Island New York City (East River)	3000	Proposed
4	Consolidated Edison Company Davids Island (Ft. Slocum) New Rochelle, New York	4000	1978
*5	Connecticut Yankee Atomic Power Company Connecticut Yankee Haddam Neck, Connecticut	567	In Operation
6	Northeast Utilities Millstone Point - Unit #1		
7	Millstone Point - Unit #2 New London, Connecticut	828	1975

[1/] See Figure A-1 for location of Nuclear Power Plants.

*Not included in Summary, Section II. Plant is located on the Connecticut River 20 Miles from Long Island Sound.

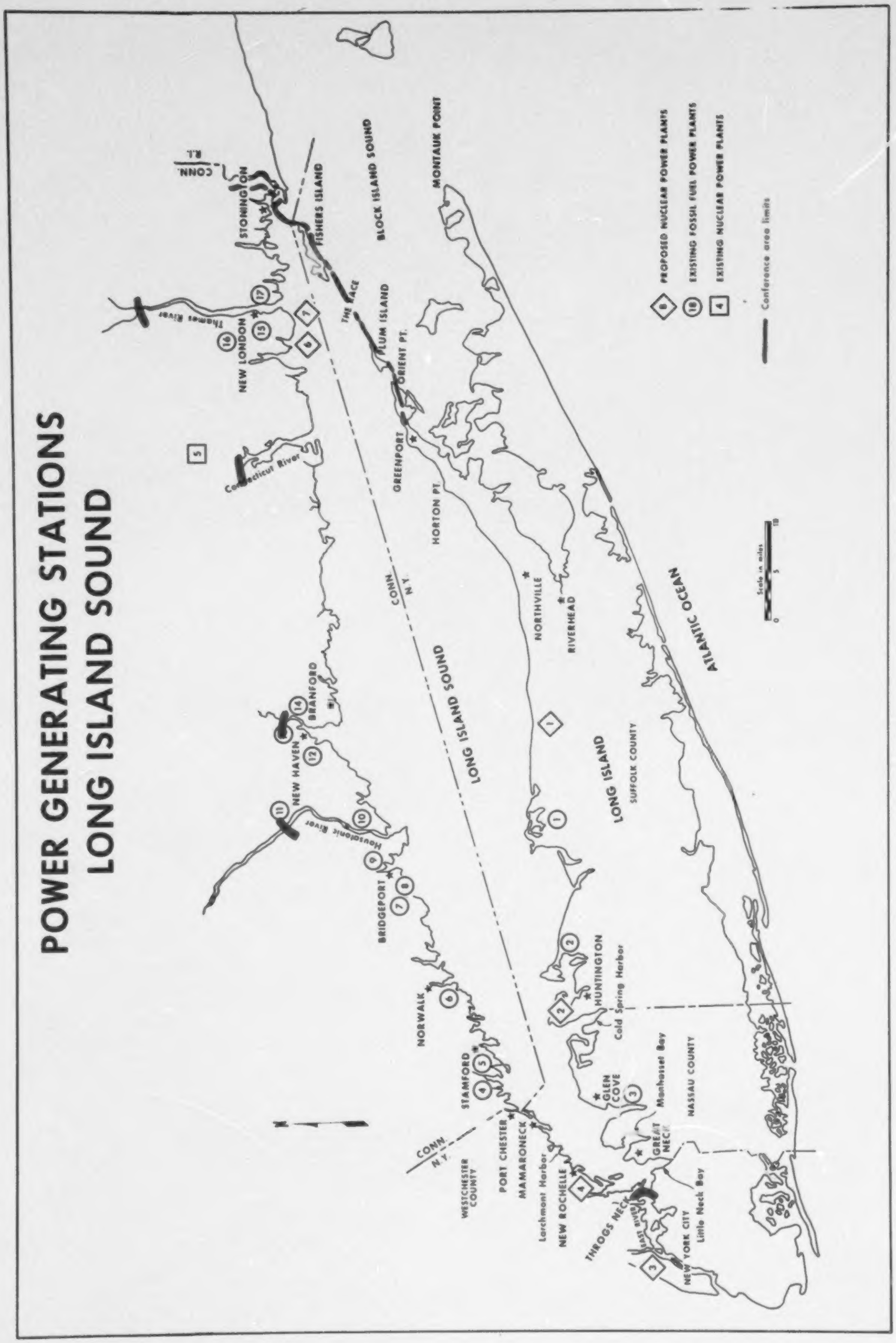
POWER GENERATING STATIONS
LONG ISLAND SOUND
PROPOSED NUCLEAR POWER PLANTS
EXISTING FOSSIL FUEL POWER PLANTS
EXISTING NUCLEAR POWER PLANTS
Conference area limits
Scale in miles
0
5
10
CONN.
R.I.
CONN.
N.Y.
WESTCHESTER COUNTY
PORT CHESTER
MAMARONECK
Larchmont Harbor
NEW ROCHELLE
THROGS NECK
EAST RIVER
NEW YORK CITY
Little Neck Bay
GREAT NECK
GLEN COVE
Manhasset Bay
NASSAU COUNTY
Cold Spring Harbor
HUNTINGTON
STAMFORD
NORWALK
BRIDGEPORT
Housatonic River
NEW HAVEN
BRANFORD
Connecticut River
NEW LONDON
Thames River
STONINGTON
FISHERS ISLAND
THE RACE
PLUM ISLAND
ORIENT PT.
GREENPORT
HORTON PT.
BLOCK ISLAND SOUND
MONTAUK POINT
LONG ISLAND SOUND
NORTHVILLE
RIVERHEAD
LONG ISLAND
SUFFOLK COUNTY
ATLANTIC OCEAN
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Figure A-1

APPENDIX B

WASTE SOURCE LISTING AND IMPLEMENTATION PLAN SCHEDULE

TABLE B-1
MUNICIPAL, PRIVATE AND INSTITUTIONAL WASTE SOURCES
LONG ISLAND SOUND

Map Ident. No.	Name	Receiving Waters	Estimated Population Served	Municipalities With Combined Sewers	Average Daily Flow (MGD)	Degree of Treatment	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/								
							Submit Preliminary Plans	Status	Submit Final Plans	Status	Start Construction	Status	Complete Construction	Status	
					NEW YORK										
1	Greenport	Long Island Sound	3,000		0.15	Primary	11/69	1					4/72		
2	Port Jefferson	Port Jefferson Harbor	9,000		0.80	Primary							4/72		
3	Kings Park Hospital	Smithtown Bay	9,500		1.00	Secondary							4/72		
4	Northport	Northport Harbor	3,000		0.15	Primary							4/72		
5	Huntington	Huntington Harbor	16,000		1.40	Secondary									
6	Quant. Biological Lab	Cold Spring Harbor	40		0.01	Secondary							4/72		
7	Oyster Bay	Oyster Bay Harbor	7,125		1.11	Secondary									
8	Glen Cove-Morgan Estates	Long Island Sound	250		-	Primary					7/71		4/72		
9	Glen Cove	Hempstead Harbor	25,000		4.20	Secondary					4/73		4/75		*
10	Roslyn	Hempstead Harbor	3,500		0.43	Secondary									
11	Port Washington	Manhasset Bay	36,415		2.52	Secondary									
12	Great Neck SD #1	Manhasset Bay	10,000		2.42	Secondary							12/68	1	*
13	Great Neck Village	Manhasset Bay	9,080		1.06	Secondary							6/71		*
14	Belgrave SD	Little Neck Bay	15,000		1.42	Secondary	-	-			7/71		7/72		*
15	Orchard Beach, NYC	Long Island Sound	Seasonal		-	Septic Tank							4/72		
16	City-Hart Island, NYC	Long Island Sound	6,000	X	1.00	Primary							4/72		
17	New Rochelle	Long Island Sound	71,390		10.60	Primary	10/69	1	3/70		2/72		12/74		*
18	Mamaroneck	Long Island Sound	167,000		14.40	Primary	-		-		-		4/72		
19	Shenrock Shore Club, Rye	Long Island Sound	Seasonal			Septic Tank							4/72		
20	American Yacht Club, Rye	Long Island Sound	Seasonal			Septic Tank							4/72		
21	Blind Brook	Long Island Sound	59,100	X	2.50	Primary	4/69	1	3/70		3/72		8/73		*
22	Port Chester	Byram River-Port Chester Harbor	23,800	X	4.20	Primary	10/69	1	4/70		3/72		9/73		*

TABLE B-1
MUNICIPAL, PRIVATE AND INSTITUTIONAL WASTE SOURCES
LONG ISLAND SOUND (Cont'd.)

							FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/								
Map Ident. No.	Name	Receiving Waters	Estimated Population Served	Municipalities With Combined Sewers	Average Daily Flow (MGD)	Degree of Treatment	Submit Preliminary Plans	STATUS	Submit Final Plans	STATUS	Start Construction	STATUS	Complete Construction	STATUS	
					CONNECTICUT										
23	Greenwich	Greenwich Harbor	42,200		4.60	Secondary									
	Byram River Interceptor												3/71		*
	Belle Haven Interceptor								11/69	1	1/70	1	1/71		*
24	Stamford	Stamford River	92,700		9.20	Primary	7/67	1	4/68	1	2/69	1	7/70		
	Interceptors						7/67	1	4/68	1	2/69	1	7/70		
25	Stamford-Indian Ridge	Stamford River	500	X	0.05	Secondary									
26	Darien	Long Island Sound	6,300		0.70	Primary	12/67	1	1/68		9/68		7/69		
27	Norwalk	Norwalk River	55,000	X	9.00	Primary	7/67	1	5/68	1	2/69		2/70		
	Sewers						6/68	1	4/69		12/69		4/71		
28	Norwalk (6th Tax Dist.)	Norwalk River		X	-	Septic Tank Sand Filter							9/71		*
29	Westport	Saugatuck River	48,000		0.50	Secondary	12/67	1	7/68	1	3/69		3/70		
30	Fairfield	Long Island Sound	30,000		3.75	Primary	2/68	1	4/68	1	12/68		10/69		
31	Bridgeport-West Side	Cedar Creek	90,000	X	24.00	Primary	9/67	1	1/69	1	6/69	1	6/71		
32	Bridgeport-East Side	Bridgeport Harbor	40,000	X	11.00	Primary	9/67	1	1/69	1	6/69	1	1/71		
33	Stratford	Housatonic River	40,000		6.00	Primary	9/67	1	6/68	1	2/69		12/69		
34	Shelton-Main	Housatonic River	10,000	X	1.00	Primary	11/67	1	7/68	1	4/69		2/70		
35	Shelton-Route 8	Housatonic River	-		1.00	Secondary	8/67	1	4/67	1	4/67	1	11/67	1	
36	Derby	Housatonic River	8,500	X	0.85	Primary	12/67	1	9/68		6/69		4/70		
37	Milford (Devon)	Housatonic River	-		-	Individual	6/67	1	7/67	1	1/68	1	5/69		
38	Milford (Town Meadows)	Milford Harbor	10,000		1.15	Secondary									
39	Milford (Harbor Plant)	Milford Harbor	4,000		0.60	Secondary									
40	Milford (Gulf Pond Plant)	Gulf Pond	6,000		1.40	Secondary									
41	West Haven	New Haven Harbor	40,000		5.00	Primary	12/67	1	12/68	1	8/69		6/70		
42	New Haven-Boulevard Plant	New Haven Harbor	76,600	X	11.30	Primary	7/68	1	12/69		11/70		11/72		

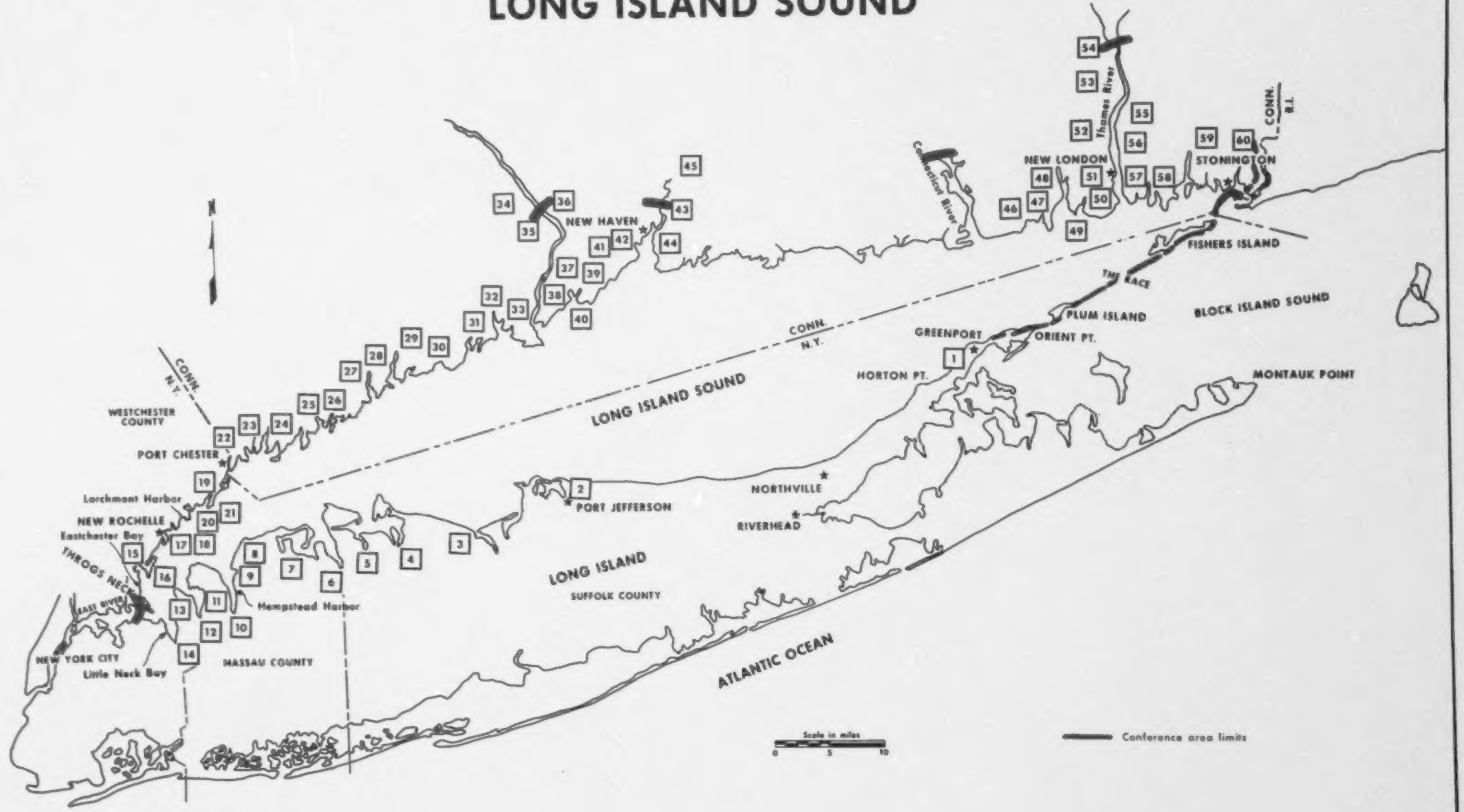
TABLE B-1
MUNICIPAL, PRIVATE AND INSTITUTIONAL WASTE SOURCES
LONG ISLAND SOUND (Cont'd.)

Map Ident. No.	Name	Receiving Waters	Estimated Population Served	Municipalities With Combined Sewers	Average Daily Flow (MGD)	Degree of Treatment	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/ Submit Preliminary Plans	STATUS	Submit Final Plans	STATUS	Start Construction	STATUS	Complete Construction	STATUS
43	New Haven-East St. Plant	New Haven Harbor	67,500	X	11.20	Primary	7/68	1	12/69		11/70		11/72	
44	New Haven-East Shore Plant	New Haven Harbor	34,900	X	6.00	Primary	7/68	1	12/69		11/70		11/72	
45	North Haven	Quinnipiac River	16,000	X	5.00	Secondary	3/68	1	7/68	1	3/69	1	2/70	1
46	East Lyme-Rocky Neck State Park	Long Island Sound	-		0.02	Primary	10/67	1	5/68	1	12/68	1	6/69	1
47	East Lyme-Niantic St.Farm	Bride Brook	-		0.03	Secondary			6/68		2/69		10/69	
48	East Lyme-Camp Dempsey	Niantic River	-		0.32	Primary	9/67	1	3/68	1	11/68	1	6/69	1
49	Waterford-Seaside St. San.	Long Island Sound	-		0.03	Primary			4/68	1	12/68	1	8/69	1
50	New London-Trumbull St.Plant	Thames River	32,700		3.20	Primary	10/67	1	9/68		7/69		7/70	
51	New London-Riverside Plant	Thames River	2,600		0.20	Primary	10/67	1	6/68		4/69		10/69	
52	Waterford	Thames River	-		-	Individual	5/68	1	6/69		6/70		6/71	
53	Montville	Thames River	-		-	Individual	10/67	1	7/68		6/69		8/70	
54	Norwich	Shetucket & Thames R.	24,000	X	1.50	Primary	12/67	1	12/68	1	10/69		10/70	
	Yantic Interceptor		4,500				12/67	1	6/68	1	6/69	1	3/70	
	Shetucket Interceptor						12/67	1	6/68		6/69		3/70	
	La. Hill & Thames Inter.						12/67	1	11/68	1	6/69		3/70	
55	Ledyard-Lifetime Homes	Williams Brook	-		0.08	Secondary	5/68	1	2/69	1	4/69	1	5/69	
56	Groton City-Fort St. Plant	Thames River	10,000		1.30	Primary	10/67	1	10/68	1	9/69	1	9/70	
57	Groton City-Branford Court	Bakers Cove	800		0.03	Secondary								
58	Groton Town-Fort Hill Homes	Mumford Cove	4,800		0.30	Secondary			7/68	1	6/69		10/70	
	Interceptor		-		-			1	7/68	1	6/69		10/70	
59	Stonington-Mystic	Mystic River	-		0.05	Individual	8/67	1	3/68	1	1/69	1	4/70	
60	Stonington-Boro	Stonington Harbor	-		0.12	Individual	8/67	1	9/68		5/69		8/70	

a/ Under the "Status" column, a "1" indicates the step has been tatus of Compliance as of March 15, 1971 for Connecticut Sources and October 30, 1970 for New York Sources.

b/ An asterisk "*" at the right margin of the Implementation Schedule established.

MUNICIPAL AND INSTITUTIONAL WASTE SOURCES
LONG ISLAND SOUND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CONN.
N.Y.
WESTCHESTER COUNTY
PORT CHESTER
Larchmont Harbor
NEW ROCHELLE
Eastchester Bay
THROGS NECK
EAST RIVER
NEW YORK CITY
Little Neck Bay
Hempstead Harbor
NASSAU COUNTY
LONG ISLAND SOUND
CONN.
N.Y.
PORT JEFFERSON
LONG ISLAND
SUFFOLK COUNTY
NORTHVILLE
RIVERHEAD
HORTON PT.
GREENPORT
ORIENT PT.
PLUM ISLAND
THE RACE
FISHERS ISLAND
BLOCK ISLAND SOUND
MONTAUK POINT
ATLANTIC OCEAN
NEW HAVEN
Connecticut River
NEW LONDON
Thames River
STONINGTON
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Scale in miles
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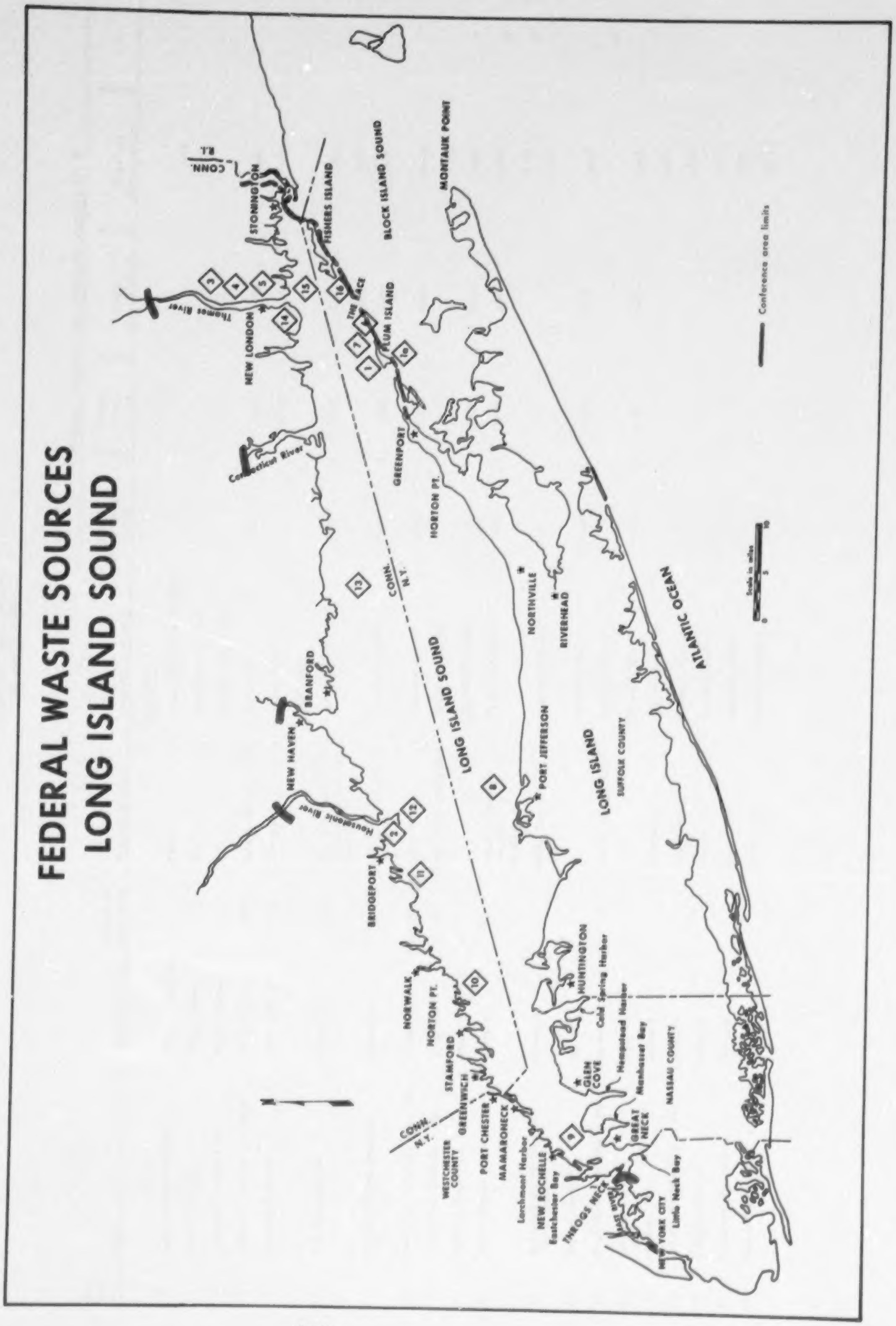
Conference area limits

Figure B-1

TABLE B-2
FEDERAL WASTE SOURCES
LONG ISLAND SOUND

Map Ident. No.	Installation	Location	Receiving Waters	Average Daily Flow (GPD)	Type of Treatment	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE Submit Preliminary Plans	STATUS	Submit Final Plans	STATUS	Start Construction	STATUS	Complete Construction	STATUS
1a	Animal Disease Lab	Plum Island, N.Y.	Block Island Sound	46,000	Chlorination Septic Tank							1972	
1	Animal Disease Lab	Plum Island, N.Y.	Long Island Sound	55,000	Grinding Neutralization Sterilization							1972	
2	U.S. Air Force Plant #43	Stratford, Conn.	Housatonic River	576,000	Secondary	7/71		12/71		2/72		10/72	
3	New London Sub Base	Groton, Conn.	Thames River	1,300,000	Primary							9/71	
4	U. S. S. Fulton	Groton, Conn.	Thames River	40,000	None							9/71	
5	Navy Barges	Groton, Conn.	Thames River	40,000	Pump to Groton Town System							12/70	1
6	Little Gull Is. Lighthouse	Little Gull Is. N.Y.	Long Island Sound	300	None							1972	
7	Plum Island Lighthouse	Plum Island, N.Y.	Long Island Sound	300	Septic Tank							1972	
8	Stratford Shoal Lighthouse	Port Jefferson, N.Y.	Long Island Sound	200	None							1972	
9	Execution Rocks Lighthouse	New Rochelle, N.Y.	Long Island Sound	400	None							1972	
10	Greens Ledge Lighthouse	Northport, N.Y.	Long Island Sound	300	None							1972	
11	Penfield Reef Lighthouse	Bridgeport, Conn.	Long Island Sound	300	None							1972	
12	Stratford Point Lighthouse	Stratford, Conn.	Long Island Sound	300	Septic Tank							1972	
13	Falkner Island Lighthouse	Guilford, Conn.	Long Island Sound	400	Septic Tank							1972	
14	New London Depot Lighthouse	New London, Conn.	Thames River	150	None							1972	
15	New London Ledge Lighthouse	New London, Conn.	Long Island Sound	300	None							1972	
16	Race Rock Lighthouse	Fishers Island, N.Y.	Long Island Sound	300	None							1972	


FEDERAL WASTE SOURCES
LONG ISLAND SOUND
CONN.
R.I.
STONINGTON
FISHERS ISLAND
BLOCK ISLAND SOUND
MONTAUK POINT
Thames River
NEW LONDON
THE RACE
PLUM ISLAND
Connecticut River
GREENPORT
HORTON PT.
CONN.
N.Y.
LONG ISLAND SOUND
NORTHVILLE
RIVERHEAD
BRANFORD
NEW HAVEN
Housatonic River
BRIDGEPORT
PORT JEFFERSON
LONG ISLAND
SUFFOLK COUNTY
ATLANTIC OCEAN
Scale in miles
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5
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Conference area limits
NORWALK
NORTON PT.
STAMFORD
GREENWICH
PORT CHESTER
MAMARONECK
WESTCHESTER COUNTY
CONN.
N.Y.
Larchmont Harbor
NEW ROCHELLE
Eastchester Bay
THROGS NECK
NEW YORK CITY
Little Neck Bay
GREAT NECK
Manhasset Bay
NASSAU COUNTY
Hempstead Harbor
GLEN COVE
Cold Spring Harbor
HUNTINGTON
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Figure B-2

TABLE B-3
INDUSTRIAL WASTE SOURCES
LONG ISLAND SOUND

						FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/								
Map Ident. No.	Name	Location	Number of Employees	Type of Product	Receiving Waters	Submit Preliminary Plans	Status	Submit Final Plans	Status	Start Construction	Status	Complete Construction	Status	
					NEW YORK									
1	Long Island Lighting Co.	Port Jefferson		Power	Port Jefferson Harbor							4/72		*
2	Shell Oil Co.	Mount Vernon		Oil	Hutchinson River									
3	Metropolitan Oil Co.	Mount Vernon		Oil	Hutchinson River									
4	Russell, Byrdsall & Ward	Port Chester	800	Nuts & Bolts	Byram River	6/69	1	3/70		8/70		8/71		*
5	Krystinel Corp.	Port Chester	70	Ferrites	Byram River			11/69	1	1/70	1	7/70	1	*
					CONNECTICUT									
6	GAF Corporation	Greenwich	814	Felt-Wool and Synthetic Filters (Sanitary)	Byram River	6/68	1	3/69	1	6/69		5/70		
										6/68		5/70		
7	Globe Slicing Machine Co., Inc.	Stamford	150	Food Slicers and Choppers	Stamford Harbor	9/68	1	1/69	1	4/69		11/69		
8	Machlett Laboratories, Inc.	Stamford	1,600	X-Ray Tubes	Noroton River	3/66	1	2/68	1	4/68	1	12/68	1	
9	Laminated Shim Co., Inc.	Stamford	250	Laminated Stampings	Stamford Harbor							7/68	1	
10	Hoffman Fuel Co., Inc.	Stamford		-	Stamford Harbor	1/70 •	1	6/70		9/70		3/71		*
11	Cerro Copper & Brass Co.	Stamford	300	Copper & Brass Products (Sanitary)	Stamford Harbor	7/68	1	12/68	1	3/69	1	12/69	1	c/
												12/69	1	c/
12	National Dairy Products Corp. (Sealtest)	Stamford		Dairy Products	Stamford Harbor							12/70		
13	Devine Brothers	Norwalk		-	Norwalk River	9/68	1	1/69	1	3/69		8/69		
14	King Organic Chemical Co.	Norwalk	10	Rubber-Plasticizers	Norwalk River									*
15	Norwalk Asphalt	Norwalk		-	Norwalk River	9/68	1	1/69	1	3/69	1	8/69	1	
16	Caldor, Inc.	Norwalk		(Sanitary)	Norwalk Harbor							4/71		
17	Fairfield Investors, Inc.	Norwalk		(Sanitary)	Norwalk Harbor							4/71		
18	Rowayton Market	Norwalk		(Sanitary)	Norwalk Harbor							9/71		
19	Rowayton Pharmacy	Norwalk		(Sanitary)	Norwalk Harbor							9/71		
20	Soybel Realty Co.	Norwalk		(Sanitary)	Norwalk Harbor							9/71		

TABLE B-3
INDUSTRIAL WASTE SOURCES
LONG ISLAND SOUND (Cont'd.)

Map Ident. No.	Name	Location	Number of Employees	Type of Product	Receiving Waters	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/ Submit Preliminary Plans	Status	Submit Final Plans	Status	Start Construction	Status	Complete Construction	Status	
21	Stephanak Brothers, Inc.	Norwalk		(Sanitary)	Norwalk Harbor									
22	Wash-A-Way Car Washers	Westport		Auto Washing	Saugatuck River							9/71		
23	Fermont Div. Dynamics Corp.	Bridgeport	250	Generator Sets-(San.)	Bridgeport Harbor									
24	Carpenter Steel	Bridgeport	1,000	Alloy & Stainless Steel	Bridgeport Harbor	12/68	1	4/69	1	7/69	1	6/70 4/70		•
25	Bullard Company	Fairfield	2,000	Machinery (Sanitary)	Bridgeport Harbor	3/68	1	12/68	1	3/69	1	12/69	1	
26	Clark Metal Products, Inc.	Fairfield	125	Small Metal Products	Bridgeport Harbor	3/68	1	12/68	1	3/69		6/68	1	
27	Wakeman Memorial, Inc.	Fairfield		(Sanitary)	Bridgeport Harbor							12/69		
28	C. O. Jelliff Mfg. Co.	Fairfield	200	Woven Wire Mesh	Bridgeport Harbor	3/68	1	12/68		3/69		10/69		
29	Electric Storage Battery Co.	Fairfield	108	Automotive Storage Batteries	Bridgeport Harbor	6/68	1	2/69	1	4/69	1	12/69 4/70	1	
30	Foremost-McKesson Lab	Fairfield	500	Pharmaceuticals	Bridgeport Harbor									
31	Handy & Harmon	Fairfield	800	Precious Metals	Bridgeport Harbor			3/69	1	6/69	1			
32	Parker's Dairy Co.	Trumbull	15	Dairy Products	Bridgeport Harbor	9/68		2/69		5/69		3/70	1	
33	Hull Dye & Print Works, Inc.	Derby	300	Textile Dying & Finishing (Sanitary)	Housatonic River	11/67	1	7/68	1	9/68	1	12/69 4/69		c/
34	The United Illuminating Co.	Derby		Electricity-(Sanitary)	Housatonic River							10/67		
35	W. E. Bassett Co.	Derby	180	Manicure Implements (Sanitary)	Housatonic River	1/68	1	3/68	1	5/68		4/70 12/68	1	
36	Apex Tool & Cutter Co., Inc.	Shelton	100	Tools, Holders & Milling Cutters (Sanitary)	Housatonic River	9/68	1	4/69	1	6/69	1	10/67 12/69	1 1	
37	B. F. Goodrich Sponge Products	Shelton	2,000	Industrial Cellular Rubber (Sanitary)	Housatonic River	1/69	1	5/69	1	7/69		4/68 4/70	1	
38	Chromium Process Co.	Shelton	225	Electroplates (Sanitary)	Housatonic River			12/67	1	3/68	1	9/68 12/68	1	
39	Driscoll Wire Co.	Shelton	75	Low Carbon Steel Wire (Sanitary)	Housatonic River	9/68	1	4/69	1	6/69		11/67 12/69	1	
40	Empire State Novelty Corp.	Shelton		- (sanitary)	Housatonic River	9/68	1	4/69	1	6/69	1	4/69 12/69 4/68	1 1 1	

TABLE B-3
INDUSTRIAL WASTE SOURCES
LONG ISLAND SOUND (Cont'd.)

Map Ident. No.	Name	Location	Number of Employees	Type of Product	Receiving Waters	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/								
						Submit Preliminary Plans	Status	Submit Final Plans	Status	Start Construction	Status	Complete Construction	Status	
41	Star Pin Co.	Shelton	160	Hairpins	Housatonic River			9/68	1	1/69		12/69		
42	Wire Novelty Mfg. Co.	Shelton	190	Wire & Metal Specialities (Sanitary)	Housatonic River	9/68	1	4/69	1	6/69	1	12/69		
43	Scotch Wash	Shelton										4/68	1	
44	East Village Land Co.	Shelton		-	Housatonic River	8/69	1	11/69	1	3/70	1	6/70	1	*
45	Chemical Plating Co.	Stratford	55	Electroplating	Housatonic River	8/69	1	11/69	1	3/70	1	6/70	1	*
46	Contract Plating Co.	Stratford	130	Metal Finishes	Housatonic River	8/68	1	1/69		4/69		1/70		
47	Ross & Roberts	Stratford	250	Vinyl & Polyethylene Film & Sheeting	Housatonic River	8/68	1	1/69	1	4/69	1	1/70		
48	Raybestos-Manhattan, Inc.	Stratford	1,250	Asbestos & Metallic Brake Linings	Housatonic River	12/68	1	5/69	1	8/69	1	6/70	1	
49	Tilo Co., Inc.	Stratford	1,500	Asphalt & Asbestos	Housatonic River	1/69	1	5/69	1	8/69	1	12/69	1	
50	Bridgeport Rolling Mills	Stratford	130	Aluminum, Brass & Bronze	Housatonic River	7/68	1	12/68	1	4/69	1	1/70	1	
51	Chatham Associates	Stratford		(Sanitary)	Housatonic River	8/68		1/69		4/69		1/70		
52	Sikorsky Aircraft	Stratford	9,832	Helicopters-(Sanitary)	Housatonic River							4/70		
53	Branch Motor Express Co.	Orange		-	Milford Harbor							12/69		
54	National Screw Products Co., Inc.	Orange		-	Milford Harbor	6/68	1	12/68	1	3/69	1	9/69	1	
55	Adley Express Corp.	Orange		-	Milford Harbor							6/68	1	
56	Syndicated Realty	Orange	50	-	Milford Harbor	6/70		6/70		9/70		3/71		*
57	Huyck Corp.	Milford	50	Paper Making Machinery	Milford Harbor	6/68	1	1/69	1	3/69	1	12/69	1	
58	Milford Rivet & Machine Co.	Milford	475	Tubular Rivets	Milford Harbor	1/68	1	4/68	1	7/68	1	12/68	1	
59	Robertshaw Control Co.	Milford	493	Metallic Bellows & Bellows Assemblies	Milford Harbor	11/67	1	2/68	1	4/68	1	10/68	1	
60	U. S. Electric Motors, Div. Emerson Electric Mfg. Co.	Milford	1,025	Electric Motors	Milford Harbor	3/68	1	10/68	1	1/69	1	12/69	1	
61	Waterbury Lock & Specialty Company	Milford	300	Locks, Cigarette Lighters	Milford Harbor	10/68	1	3/69	1	6/69		6/70		

TABLE B-3
INDUSTRIAL WASTE SOURCES
LONG ISLAND SOUND (Cont'd.)

Map Ident. No.	Name	Location	Number of Employees	Type of Product	Receiving Waters	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/ Submit Preliminary Plans	Status	Submit Final Plans	Status	Start Construction	Status	Complete Construction	Status	
62	Secondi Brothers Service Station	Milford		-	Milford Harbor	1/70	1	2/70	1	5/70	1	12/70		*
63	The Rex Company	Milford			Milford Harbor	5/70		7/70		9/70		12/70		*
64	Eldorado Trans. Co.	Milford			Milford Harbor	5/70		7/70		9/70		12/70		*
65	Volvo City	Milford		Auto Dealer	Milford Harbor									
66	American Powdered Metals	North Haven	200	Powdered Metal Parts	Quinnipiac River	10/68	1	2/69	1	5/69	1	12/69	1	
67	Burndy Corp.	North Haven	200	Electrical Connectors	Quinnipiac River			1/69	1	4/69	1	12/69	1	
68	City Printing Co.	North Haven	75	Printing & Lithography	New Haven Harbor			12/67	1	3/68	1	6/68	1	
69	Humphrey Chemicals	North Haven	25	Organic Chemicals	Quinnipiac River	1/68	1	7/68		10/68		5/69		
70	Platt & Labonia Co.	North Haven	60	Sheet Metal Fabricators	Quinnipiac River			1/69		4/69		12/69		
71	Axton-Cross Co.	North Haven	60	Industrial Chemicals	Quinnipiac River									
72	Pratt & Whitney Aircraft (United Aircraft)	North Haven	2,500	Aircraft & Marine Engines	Quinnipiac River	11/68	1	11/69	1	3/70		6/71		
73	Union Carbide, Linde Air Products Co., Inc.	North Haven	15	Compressed Gases	Quinnipiac River	8/68	1	12/68	1	3/69	1	9/69	1	
74	O. F. Mossberg & Sons	North Haven	300	Firearms	New Haven Harbor	6/69	1	11/69		1/70		6/70		*
75	Upjohn Co., Carwin Organic Chemicals	North Haven	200	Synthetic Organic Chemicals	Quinnipiac River	8/69	1	2/70	1	5/70		11/70		
76	Upjohn Co., Carwin Organic Chemicals	North Haven	200	Synthetic Organic Chemicals	Quinnipiac River	2/68	1	5/68	1	7/68	1	2/69	1	
77	Vincent Buonocore & Sons	North Haven	45	Wines	New Haven Harbor	9/69	1	3/70		5/70		12/70		*
78	Drabkin Family Spray Trust	North Haven			New Haven Harbor	1/71		6/71		8/71		3/72		*
79	Circuit-Wise, Inc.	North Haven	26	Printed Circuit Boards	New Haven Harbor	1/71		6/71		8/71		3/72		*
80	C. W. Blakeslee & Sons	New Haven		General Contracting	New Haven Harbor	3/68	1	6/68	1	8/68	1	12/68	1	
81	Federal Paper Board Co.	New Haven	750	Folding Boxboard	Mill River	7/68	1	12/68		3/69		3/70		

TABLE B-3
INDUSTRIAL WASTE SOURCES
LONG ISLAND SOUND (Cont'd.)

Map Ident. No.	Name	Location	Number of Employees	Type of Product	Receiving Waters	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/ Submit Preliminary Plans	Status	Submit Final Plans	Status	Start Construction	Status	Complete Construction	Status	
82	Humble Oil	New Haven		-	New Haven Harbor	11/68	1	3/69	1	6/69	1	12/69	1	
83	Mite Corp.	New Haven	300	Electrical Equipment	West River	11/68	1	3/69		6/69		12/69		
84	New Haven Board & Carton	New Haven	500	Folding Boxboard	Mill River	7/68	1	12/68	1	3/69		3/70		
85	Seamless Rubber Co., Div. Rexall Drug & Chemical Co.	New Haven	900	Rubber Sundries	New Haven Harbor	11/68	1	3/69		6/69		12/69		
86	U. S. Steel, American Steel & Wire Div.	New Haven	300	Hot Rolled & Cold Finished Bars	Quinnipiac River	8/68	1	3/69	1	6/69		3/70		
87	New Haven Malleable Iron Co.	New Haven		(Sanitary)	New Haven Harbor							6/68		
88	Textron Electronics	New Haven		-	New Haven Harbor	5/69	1	10/69		2/70		12/70		*
89	Penn Central Co., Union St.	New Haven		-	New Haven Harbor			5/70		10/70		10/71		*
90	Penn Central Co., Cedar Hall	New Haven		-	Quinnipiac River	3/70		5/70		10/70		10/71		*
91	Himmel Brothers	Hamden	70	Metal Moldings	Whitney Lake	6/68	1	1/69	1	3/69	1	2/70	1	
92	Giering Metal Finishing, Inc.	Hamden	50	Metal Finishings	New Haven Harbor	7/68	1	2/69	1	4/69		3/70		
93	South Conn. Gas Co.	New Haven		(Sanitary)	New Haven Harbor							7/72		
94	The United Illuminating Co.	New Haven		Electricity-(Sanitary)	Mill River							7/72		
95	Corenco Corp.	West Haven	625	Tallow & Grease Hides	New Haven Harbor	9/69	1	3/70		5/70		12/70		*
96	Car Washers, Inc.	West Haven		Auto Washing	New Haven Harbor	2/70		2/70		5/70		10/70		*
97	American Buckle Co.	West Haven	20	Clothing Buckles	New Haven Harbor	12/69	1	2/70	1	6/70	1	12/70	1	*
98	Armstrong Rubber Co.	West Haven	1,471	Tires & Tubes	New Haven Harbor	1/71		6/71		9/71		4/72		*
99	Arcola Wire Co.	Branford	11	Round Aluminum Wire and Rod	Branford Harbor	8/68	1	12/68	1	4/69		12/69		
100	D. J. King	Branford			Branford Harbor	8/68	1	1/69	1	3/69		9/69		

TABLE B-3
INDUSTRIAL WASTE SOURCES
LONG ISLAND SOUND (Cont'd.)

Map Ident. No.	Name	Location	Number of Employees	Type of Product	Receiving Waters	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/ Submit Preliminary Plans	Status	Submit Final Plans	Status	Start Construction	Status	Complete Construction	Status	
101	Carroll Johnson	Branford		(Sanitary)	Branford Harbor			4/68		6/68		8/68		*
102	Mr. & Mrs. George Hugret	Branford		(Sanitary)	Branford Harbor			4/68		6/68		8/68		*
103	Brandon Company	Branford		(Sanitary)	Branford Harbor							12/68	1	
104	Echlin Mfg. Co.	Branford	550	Automobile Parts	Branford Harbor	6/69	1	11/69	1	4/70	1	9/70	1	*
105	Atlantic Wire Co.	Branford	250	Iron & Steel Wire	Branford Harbor	11/68	1	7/69	1	9/69	1	4/70		*
106	Summit House Restaurant	Branford		(Sanitary)	Branford Harbor							12/68	1	
107	Malleable Iron Fittings Co.	Branford	622	Metal Fabricating (Sanitary)	Branford Harbor	12/69	1	3/70		6/70		10/70 1/70	1	* *
108	Olin Corporation	Branford			Branford Harbor									
109	Maple Shade Farm, Inc.	Guilford	100	Dairy Products	Guilford Harbor			9/67		10/67		4/68		
110	Waverly Chemical Co., Inc.	Guilford	5	Magnesium	Guilford Harbor	12/68	1	12/68	1	4/70		6/70		*
111	Madison Laundermat	Madison		-	Guilford Harbor			2/68	1	4/68	1	7/68	1	
112	Chesebrough-Ponds, Inc.	Clinton	1,450	Pharmaceuticals	Clinton Harbor	5/68	1	11/68		2/70		10/70		
113	Universal Wire of Bostitch Division of Textron, Inc.	Clinton	100	Wire Drawings	Clinton Harbor	5/69	1	2/70	1	7/70		4/71		*
114	Verplex Company	Essex	200	Lampshades	Connecticut River	6/68	1	9/68	1	11/68	1	3/69	1	*
115	Chas. Pfizer & Co., Inc.	Groton	2,000	Pharmaceuticals	Thames River	12/67	1	5/68	1	8/68		8/69		
116	General Dynamics Corp. Electric Boat Div.	Groton	18,000	Ships-(Sanitary)	Thames River			6/69	1	8/69	1	11/69	1	*
117	Compass, Inc.	Groton	5	Newspaper-(Sanitary)	Thames River							11/70		
118	Fusconi Cleaners & Tailors	Groton		-	Thames River							9/71		*
119	Lifetime Homes, Inc.	Ledyard		(Sanitary)	Thames River	5/68	1	9/68		1/69		4/69		c/
120	Campenelli Corp.	Ledyard		-	Thames River			8/68	1	10/68	1	4/69	1	*

TABLE B-3
INDUSTRIAL WASTE SOURCES
LONG ISLAND SOUND (Cont'd.)

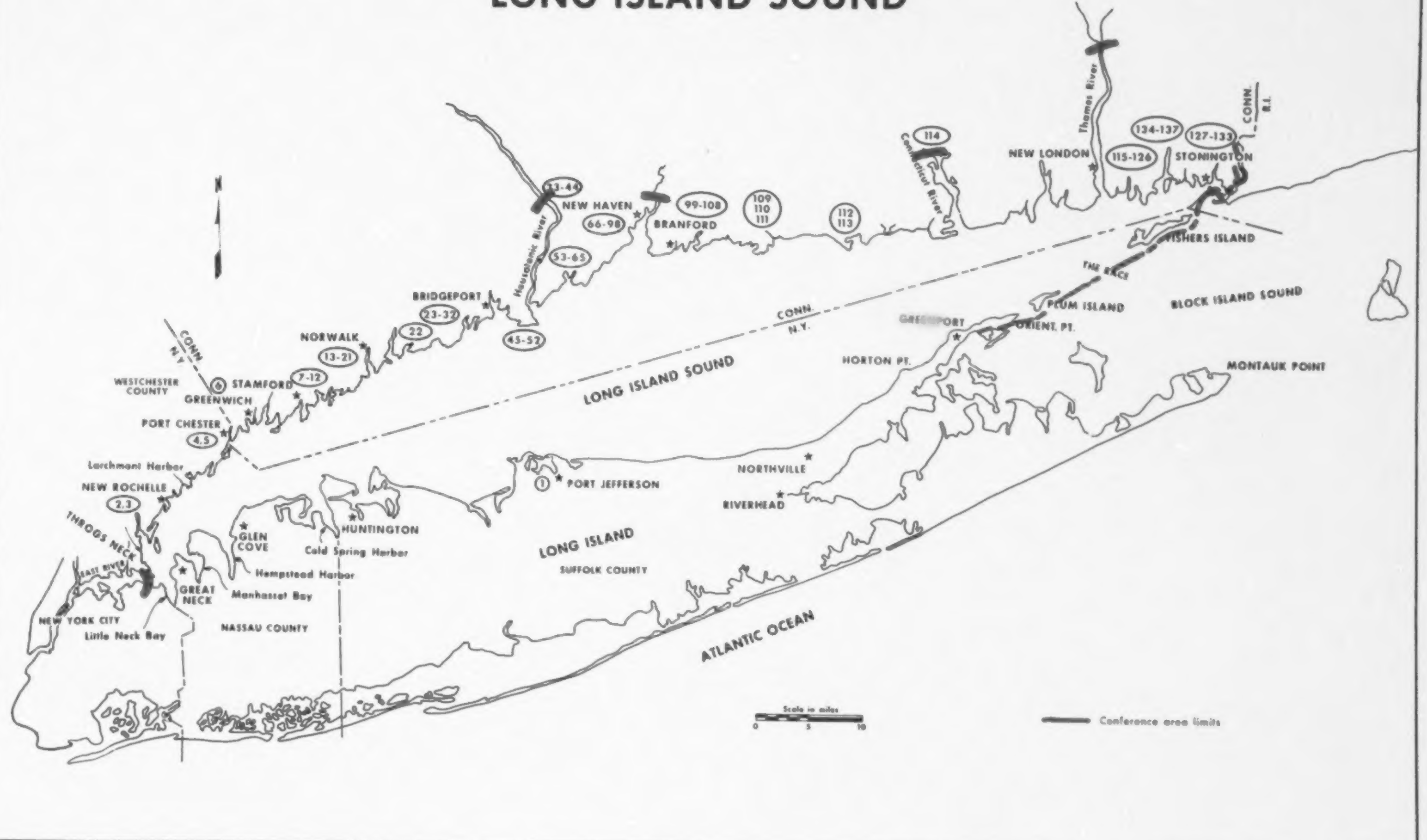
Map Ident. No.	Name	Location	Number of Employees	Type of Product	Receiving Waters	FEDERALLY APPROVED IMPLEMENTATION SCHEDULE a/, b/ Submit Preliminary Plans	Status	Submit Final Plans	Status	Start Construction	Status	Complete Construction	Status	
121	Continental Can Co.	Montville	174	Metal Cans (Sanitary)	Thames River	2/69 4/68		10/69 6/68		4/70 9/68		4/71 12/68		
122	Federal Paper Board Co.	Montville	100	Folding Boxboards	Oxoboxo Brook	2/69		10/69		4/70		4/71		c/
123	Robertson Paper Box Co.	Montville	400	Folding Boxboards	Oxoboxo Brook	2/69	1	10/69		4/70		4/71		
124	Thomas G. Faria Corp.	Montville	130	Automotive & Marine Instruments	Thames River							12/71		
125	Finley Screw Machine Prod.	Montville	5	Screw Machine Prod.	Thames River							12/71		
126	Conn. Light & Power Co.	Montville		Power	Thames River									
127	American Velvet Co. (A. Wimpfheimer & Brothers, Inc.)	Stonington	350	Velvet & Plushes (Sanitary)	Stonington Harbor							12/70 12/70		
128	Monsanto Company	Stonington	100	Plastic Bottles (Sanitary)	Stonington Harbor							12/70 12/70		
129	Douglas Randall, Inc. (Subsid. of Walter Kidde & Co., Inc.)	Stonington	250	Electronic Equipment	Stonington Harbor							12/70		*
130	Carole Realty	Stonington		-	Fishers Island Sound							12/70		
131	Micro Leather	Stonington		Leather Products	Fishers Island Sound							12/70		
132	Aaron Levine	Stonington		-	Fishers Island Sound							12/70		
133	Russell A. Linihan	Stonington		-	Fishers Island Sound							12/70		
134	Cooper Laboratories (The Packer Co. Div.)	Stonington	20	Soaps & Shampoos (Sanitary)	Mystic River							12/70 12/70		
135	Puritan Laundry	Stonington	15	Laundry	Mystic River							12/70		
136	Sirtex Printing Co.	Stonington	20	Textile Printing (Sanitary)	Mystic River	3/68		8/68 3/68		11/68 6/68		9/69 9/68		
137	General Dynamics Corp.	Stonington	18,000	Ship Construction	Mystic River							12/70		

a/ Under the "Status" column, a "1" indicates the step has been completed, a blank indicates it has not been completed. Status of Compliance as of March, 1971.

b/ An asterisk "*" at the right margin of the Implementation Schedule indicates it is a State schedule with no Federal schedule established.

c/ No longer discharging wastewater.

INDUSTRIAL WASTE SOURCES
LONG ISLAND SOUND


CONN.
R.I.
134-137
127-133
115-126
STONINGTON
NEW LONDON
Thames River
114
Connecticut River
112
113
109
110
111
99-108
BRANFORD
NEW HAVEN
66-98
33-44
Housatonic River
53-65
45-52
BRIDGEPORT
23-32
22
NORWALK
13-21
7-12
STAMFORD
6
CONN.
N.Y.
WESTCHESTER COUNTY
GREENWICH
PORT CHESTER
4.5
Larchmont Harbor
NEW ROCHELLE
2.3
THROGS NECK
EAST RIVER
NEW YORK CITY
Little Neck Bay
GREAT NECK
Manhasset Bay
Hempstead Harbor
GLEN COVE
Cold Spring Harbor
HUNTINGTON
NASSAU COUNTY
LONG ISLAND
SUFFOLK COUNTY
1
PORT JEFFERSON
LONG ISLAND SOUND
CONN.
N.Y.
NORTHVILLE
RIVERHEAD
HORTON PT.
GREENPORT
ORIENT PT.
PLUM ISLAND
THE RACE
FISHERS ISLAND
BLOCK ISLAND SOUND
MONTAUK POINT
ATLANTIC OCEAN
Scale in miles
0
5
10
Conference area limits

58

Figure B-3

TABLE B-4

COMBINED SEWER SYSTEMS
LONG ISLAND SOUND

Municipal System	Estimated Population Served
New York	
City-Hart Island	6,000
Port Chester	23,800
Blind Brook	59,100
Mamaroneck	167,000
	255,900
Connecticut	
Stamford-Indian Ridge	500
Bridgeport-East Side	40,000
Bridgeport-West Side	90,000
Shelton-Main	10,000
Derby	8,500
New Haven-Boulevard Plant	76,600
New Haven-East Street Plant	67,500
New Haven-East Shore Plant	34,900
North Haven	16,000
Norwich	24,000
Norwalk	55,000
Norwalk-6th Tax District	-
	423,000
	678,900

APPENDIX C

LETTER FROM LONG ISLAND OYSTER FARMS INC., NEW HAVEN, CONNECTICUT AND STATE OF CONNECTICUT SHELL FISH COMMISSION, MILFORD, CONNECTICUT REGARDING ECONOMIC LOSS TO SHELLFISH INDUSTRY AS RESULT OF WATER POLLUTION.

COPY

STATE OF CONNECTICUT
Shell Fish Commission
Rogers Avenue
P.O. Box 97
Milford, Conn. 06460
874-0696

February 11, 1971

Mr. Edward F. M. Wong
Shellfish Consultant
Environmental Protection Agency
Water Quality Office
240 Highland Avenue
Needham Heights, Mass. 02194

Dear Ed:

With reference to our telephone conversation concerning the cost of water pollution as related to our shellfishery, I am enclosing a copy of the report made to the Clean Water Task Force in 1966 which may be helpful. You will note that I estimated the total loss at over a billion dollars just in the shellfishery alone.

I am also enclosing a copy of the article in the New Haven Journal Courier, Monday, February 8, 1971, also a copy of work done by the University of Southern California concerning the Santa Barbara blowout which should be of interest.

Have you seen the latest work by George C. Matthiessen entitled, "A Review of Oyster Culture and the Oyster Industry in North America?" If not, I have an extra copy and will send it to you.

Sincerely,

CONN. STATE SHELL FISH COMM.

Ernest J. Bontya
Engineer

EJB:mem
Encl.

COPY

COPY

Of all the problems that face the Connecticut shellfisheries, the pollution of our rivers and costal waters has become the most serious. To appreciate this condition and its consequences, a brief review of the shellfisheries would be appropriate. The estuaries and wetlands form a complex ecological system contributing to a wide variety of fish and wildlife. The shellfisheries, as a part of such a complex, are in even more delicate balance in the requirements of a productive environment. Type of bottom, temperature, salinity, water quality and food are all key factors in the shellfish cycle and the variation of one is critical to growth and reproduction. Connecticut was gifted in this unique combination of conditions and became one of the most prolific shellfisheries in the world. At the turn of the century, production was over 3,000,000 bushels of mature and seed oysters annually. At today's prices, this would be about $40,000,000 per year. The decline of this industry as a result of the environmental change along our shorelines has been at the cost of over a billion dollars in shellfish during the past 65 years. Add to this the loss of the commercial finfishery that also prospered in Connecticut during this period as well as the future cost of pollution abatement and we have already had a costly lesson in the value of our water resources.

Today, the shellfisheries consist of approximately 64,000 acres; 46,000 acres under State control and 18,000 acres as Town ground.

COPY

Of the total, 42,000 acres would be considered oyster grounds, 20,000 acres of clam ground and 2,000 acres of escallop ground. The industry is generally located from Greenwich to Branford and has been the area of the greatest lost of productive ground. The area from Branford easterly to Stonington is predominately a sports shellfishery with a small commercial shellfishery in a number of towns. The total product value for both the commercial and sports shellfishery for 1964 is estimated at two and a half million dollars. Production for 1965 will be lower due to the continuing decline in water quality from pollution and the lack of fresh water run-off.

WATER POLLUTION

The shellfisheries require a high standard of water quality for propagation and more importantly, the protection of the consumer. Approximately 35% of all shellfish grounds are closed by the State Health Department for poor water quality. This closure prohibits direct marketing of oysters or clams from specific areas, however, transplanting to clean water is permitted under strict control. There are two general kinds of water pollution creating problems for our industry. Untreated or partially treated domestic sewage deposits sludge on shellfish grounds and removes dissolved oxygen from the water making the grounds useless for production. Domestic sewage also carries various types of human diseases which can be transmitted to humans. Industrial pollution is the disposal of wastes from manufacturing plants but it is convenient to broaden the definition to include other chemical pollutants such as detergents, oil, pesticides, chemical fertilizers and weed killers that wash into our streams. The effects of industrial waste are varied and often not as clear cut as domestic sewage. It is also economically impossible to remove the last trace of waste materials from processed water and harmful pollution can originate even in the presence of acceptable standards which might be met by a manufacturer in waste treatment. Considering the nature and extent of our polluted waters, it can be assumed that our major estuaries such as the Thames River, Connecticut River, New Haven Harbor and the Housatonic River can never be totally reclaimed for direct market shellfish. The remaining clean waters of Connecticut are therefore a valued asset and one objective of any program should be to prevent their loss to pollution as well as to support pollution abatement to bring other areas to more acceptable standards.

SHELLFISH FUTURE

The future of the shellfisheries is at best a challenge. There is a correlation in the loss of the former productive natural environment in our estuaries and the decline in shellfish production. Pollution, filling of the marshlands, dredging for gravel or fill, navigation projects, erosion and hurricane protection have all taken their toll. The environment that created our 3,000,000 bushel years is gone and although there are still thousands of acres of good shellfish bottom available, their ability to produce is keyed to a declining water quality. Recent developments in oyster and clam culture offer a number of areas of promise to the shellfish industry. Chemical control of some predators is now practical. The process known as depuration is available for the cleansing of shellfish from moderately polluted areas and would open thousands of acres of clam grounds. The artificial spawning of oysters and clams is in operation on Long Island and has excellent commercial possibilities, however, natural spawning will still be needed for volume production and our future shellfisheries will be dependent on a clean and productive water quality.

THE PROBLEM

The shellfisheries of Connecticut are an example of the consequences in the misuse or destruction of our irreplaceable natural resources. The hub of the commerical shellfisheries was the area between New Haven and Bridgeport. The Bridgeport beds were supported by the Housatonic River and the history of this river and it's pollution is well known. The New Haven Harbor is the terminal for three rivers: the West River, the Mill River and the Quinnipiac River. All of these streams are polluted in varying degrees and the Mill River is the classic example of our stream pollution problem. Its putrid grey green waters can only be appreciated by sight and smell. Pulp plants are the major contributors to this pollution and action by many local groups to correct the flagrant violation of pollution laws and common sense is defeated by political expediency and a negative attitude on the part of enforcement officials. The law is being compromised for jobs and our public waters have become their private sewer. The Mill River demonstrates how little protection the public interest and our water resources have had wherever the problem is basically the law and its administration. The emphasis being placed on pollution abatement is essentially a technical matter, however, without the strong support of our laws to prevent the increase of sources of pollution, much of any program would be wasted and therefore, our recommendations are limited to what we consider the first phase of clean water program.

1. Revise existing statutes, to clarify and define the State role and responsibility in water pollution control with emphasis on a policy that will recognize, preserve and protect the public interest in fish, wildlife and water resources.
2. The prevention and control of pollution is primarily a public health problem and should be under the jurisdiction of the State Health Department as a direct line responsibility. The professional stature of the State Health Department would minimize the pressures of special interests. Today, the dual role of the Health Department and the Water Resources Commission apparently provides a grey area of jurisdiction which is both a refuge and a source of inaction in resolving our pollution problems in the best interests of the public.
3. The existence of the Clean Water Task Force is an indication of what has not been done and on the basis of past experience, we have no

assurance of what will be done to implement and support pollution prevention and abatement in the waters of Connecticut. A citizen's group to oversee a clean water program for a period of five to ten years might be appropriate and would at least provide support and strength to the actions of any State agency that will in time be in charge of millions of dollars in pollution abatement programs.

Water pollution along the shores of Greenwich, Stamford and Darien have contributed to closing of several oyster firms in the area. Out of 11 oyster dealers operating in the Norwalk-Darien area, five have gone out of business with very little chance of returning. The Norwalk Estuary, including parts of Darien, produces approximately one million dollars worth of shellfish annually.

Even though pollution has closed an ever-increasing number of shellfish beds, interest seems to continue in commercial and recreational shellfishing. But even here the trend is downhill if we can use recent events in Norwalk as a representative example. From 1959-1965 there was a gradual increase to over 1,300 clamming permits issued annually in Norwalk. After 1965 the number declined, reaching about 900 in 1969.

APPENDIX D

WATER QUALITY STANDARDS

COPY

ANTIDEGRADATION STATEMENT
NEW YORK STATE

It is recognized that certain waters of New York State possess an existing quality which is better than the classification standards assigned thereto. The quality of these waters will be maintained unless and until it has been demonstrated to the satisfaction of the Commissioner of Environmental Conservation that other uses and different standards are justifiable as a result of necessary economic or social development. To accomplish this objective all proposed new or increased sources of pollution will be required to provide the best practical degree of waste treatment to maintain these waters at this higher quality.

In addition, there will be furnished to the Federal Water Quality Administration, U. S. Department of the Interior, such information as is needed to enable the Secretary of the Interior to fulfill his responsibilities under the Federal law.

Water which does not meet the assigned classification will be improved to meet the standards.

Adopted by Water Resources Commission
May 7, 1970

COPY

4. Classes and Standards For Tidal Salt Waters

CLASS SA

Best usage of waters: Shellfishing for market purposes and any other usages.

Quality Standards for Class SA Waters

Items	*Specifications*
1. Floating solids; settleable solids; oil; sludge deposits.	None attributable to sewage, industrial wastes or other wastes.
2. Garbage, cinders, ashes, oils, sludge or other refuse.	None in any waters of the Marine District as defined by State Conservation Law.
3. Sewage or waste effluents.	None which are not effectively disinfected.
4. Dissolved oxygen.	Not less than 5.0 parts per million.
5. Toxic wastes, deleterious substances, colored or other wastes or heated liquids.	None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.
6. Organisms of Coliform group.	The median MPN value in any series of samples representative of waters in the shellfish growing area shall not be in excess of 70 per 100 milliliters.

CLASS SB

Best usage of waters: Bathing and any other usages except shellfishing for market purposes.

Quality Standards for Class SB Waters

Items	*Specifications*
1. Floating solids; settleable solids; oil; sludge deposits.	None attributable to sewage, industrial wastes or other wastes.
2. Garbage, cinders, ashes, oils, sludge or other refuse.	None in any waters of the Marine District as defined by State Conservation Law.
3. Sewage or waste effluents.	None which are not effectively disinfected.
4. Dissolved oxygen.	Not less than 5.0 parts per million.
5. Toxic wastes, deleterious substances, colored or other wastes or heated liquids.	None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color,

odor or sanitary condition thereof; and otherwise none in sufficient amounts to make the waters unsafe or unsuitable for bathing or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS SC

Best usage of waters: Fishing and any other usages except bathing or shellfishing for market purposes.

Quality Standards for Class SC Waters

Items	*Specifications*
1. Floating solids; settleable solids; sludge deposits.	None which are readily visible and attributable to sewage, industrial wastes or other wastes or which deleteriously increase the amounts of these constituents in receiving waters after opportunity for reasonable dilution and mixture with the wastes discharged thereto.
2. Garbage, cinders, ashes, oils, sludge or other refuse.	None in any waters of the Marine District as defined by State Conservation Law.
3. Dissolved oxygen.	Not less than 5.0 parts per million.
4. Toxic wastes, oil, deleterious substances, colored or other wastes or heated liquids.	None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS SD

Best usage of waters: Any usages except fishing, bathing, or shellfishing for market purposes.

Quality Standards for Class SD Waters

Items	*Specifications*
1. Floating solids; settleable solids; sludge deposits.	None which are readily visible and attributable to sewage, industrial wastes or other wastes or which deleteriously increase the amounts of these constituents in receiving waters after opportunity for reasonable dilution and mixture with the wastes discharged thereto.
2. Garbage, cinders, ashes, oils, sludge or other refuse.	None in any waters of the Marine District as defined by State Conservation Law.
3. Dissolved oxygen.	Not less than 3.0 parts per million.

"(h) 'Board' means the New York water pollution control board created by this article."

Library references

Health 🔑28.

Waters and Water Courses 🔑37, 38, 64–70, 72.

C.J.S. Health § 21.

C.J.S. Waters §§ 3, 5, 43 et seq., 53.

1. Waters of the state

The "waters of the state" include all fresh water in streams, public or private, and board had power to classify creek even though it was a non-navigable stream, the title of which was in private riparian owners. Application of City of Johnstown, 1961, 12 A.D.2d 218, 209 N.Y.S.2d 982.

TITLE II—CLASSIFICATION OF WATERS AND ADOPTION OF STANDARDS

Sec.

1205. Classification of waters and adoption of standards by Water Resources Commission.

Title added by L.1961, c. 490, § 5, eff. Jan. 1, 1962. A former Title II, which related to the water pollution control board, was omitted by the same act, eff. Jan. 1, 1962.

Law Review Commentaries

Water pollution control in New York. 31 Albany L.Rev. 50 (1967).

§ 1205. Classification of waters and adoption of standards, by water resources commission

1. It is recognized that, due to variable factors, no single standard of quality and purity of the waters is applicable to all waters of the state or to different segments of the same waters.

2. In order to attain the objectives of this article, the water resources commission after proper study, and after conducting public hearing upon due notice, shall group the designated waters of the state into classes. Such classification shall be made in accordance with considerations of best usage in the interest of the public and with regard to the considerations mentioned in subdivision three hereof.

3. In adopting the classification of waters and the standards of purity and quality above mentioned, the water resources commission shall give consideration to:

(a) the size, depth, surface area covered, volume, direction and rate of flow, stream gradient and temperature of the water;

(b) the character of the district bordering said waters and its peculiar suitability for the particular uses, and with a view to conserving the value of the same and encouraging the most appropriate use of lands bordering said waters, for residential, agricultural, industrial or recreational purposes;

(c) the uses which have been made, are being made or may be made, of said waters for transportation, domestic and industrial consumption, bathing, fishing and fish culture, fire prevention, the disposal of sewage, industrial waste and other wastes, or other uses within this state, and, at the discretion of the water resources commission, any such uses in another state on interstate waters flowing through or originating in this state;

(d) the extent of present defilement or fouling of said waters which has already occurred or resulted from past discharges therein.

4. The water resources commission, after proper study, and after conducting public hearings upon due notice, shall adopt and assign standards of quality and purity for each such classification necessary for the public use or benefit contemplated by such classification. Such standards shall prescribe what qualities and properties of water shall indicate a polluted condition of the waters of the state which is actually or potentially deleterious, harmful, detrimental or injurious to the public health, safety or welfare, to terrestrial or aquatic life or the

growth and propagation thereof, or to the use of such waters for domestic, commercial, industrial, agricultural, recreational or other reasonable purposes, with respect to the various classes established pursuant to subdivision two hereof.

5. In establishing such standards, consideration shall be given to the following factors:

(a) the extent, if any, to which floating solids may be permitted in the water;

(b) the extent to which suspended solids, colloids or a combination of solids with other substances suspended in water, may be permitted;

(c) Organisms of the coliform group or any other organisms from wastes of animal or human origin shall not exceed the following prescribed standards for usage of the classified waters of the state:

(i) Sources of water supply for drinking, culinary or food processing purposes which, if subjected to approved disinfection treatment, with additional treatment if necessary to remove naturally present impurities, meet or will meet New York state health department drinking water standards and any other usages: For such sources the monthly median coliform value for one hundred ml of sample shall not exceed fifty from a minimum of five examinations and provided that not more than twenty percent of the samples shall exceed a coliform value of two hundred forty for one hundred ml of sample.

(ii) Sources of water supply for drinking, culinary or food processing purposes which, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to reduce naturally present impurities, will meet New York state department of health drinking water standards; bathing, fishing, boating, and any other usages: For such sources the monthly median coliform value for one hundred ml of sample shall not exceed five thousand from a minimum of five examinations and provided that not more than twenty percent of the samples shall exceed a coliform value of twenty thousand for one hundred ml of sample.

(iii) Sources of water for bathing, fishing, boating, and any other usages except shellfishing for market purposes in tidal salt waters: For such sources the monthly median coliform value for one hundred ml of sample shall not exceed two thousand four hundred from a minimum of five examinations and provided that not more than twenty percent of the samples shall exceed a coliform value of five thousand for one hundred ml of sample and provided further that surface waters receiving treated sewage discharges which pass through residential communities where there is a potential exposure of population to the surface waters shall be protected by the requirement that all effluents from sewage treatment plants shall be adequately disinfected prior to discharge into the surface waters in order that the monthly median coliform value for one hundred ml of sample shall not exceed two thousand four hundred from a minimum of five examinations and provided that not more than twenty percent of the samples shall exceed a coliform value of five thousand for one hundred ml of sample.

(iv) Sources of water for shellfishing for market purposes and any other usages of tidal salt waters: Median MPN not to exceed seventy coliform organisms per one hundred milliliter sample in a series of four or more samples collected during any thirty-day period in the waters of a shellfishing area, and not exceeding in more than ten percent of the samples collected during the period an MPN of two hundred thirty coliform organisms per one hundred milliliters for a five-tube, or an MPN of three hundred thirty per one hundred milliliters for a three-tube decimal dilution test in those areas most probably exposed to fecal contamination during the most unfavorable hydrographic conditions.

(v) All samples shall be collected, analyzed, and reported in a manner satisfactory to the state commissioner of health.

State of New York

PART 704

CRITERIA GOVERNING THERMAL DISCHARGES (HEATED LIQUIDS)

(Statutory authority: Conservation Law, § 420)

Sec.
704.1 Criteria governing thermal discharges (heated liquids)
704.2 Additional limitations or modifications
704.3 Rules and regulations
704.4 Extent of applicability of criteria to existing discharges

Historical Note

Part (§§ 704.1-704.4) added, filed Aug. 13, 1969 eff. Aug. 12, 1969.

Section 704.1 Criteria governing thermal discharges (heated liquids). The standards for thermal discharges (heated liquids) to the waters of the State are "None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to fish life . . . or impair the waters for any other best usage . . ." (6 NYCRR 701.3 *et seq.*) and shall be applied, under Water Pollution Control Act, Public Health Law, article 12, as follows:

(a) *Definitions.* (1) A *thermal discharge* is one which is at a temperature greater than 70°F. A discharge at a lower temperature will also be a thermal discharge if it results in a temperature rise of the receiving water above the permissible temperature rises listed below.

(2) The term *addition of heat of artificial origin* as used throughout the criteria shall include all heat from other than natural sources. In the event of multiple discharges, consideration shall be given to the cumulative effects of such discharges.

(3) *Coastal waters* are those marine waters within the territorial limits of the State other than estuaries.[*]

(4) *Estuaries* are the tidal portions of all rivers and streams, the bays of the south shore of Long Island and Peconic Bay.[*]

(b) *Fresh waters.*

(1) *Streams.* (i) *Non-trout waters.* The water temperature at the surface of a stream shall not be raised to more than 90°F at any point. Further, at least 50 percent of the cross sectional area and/or volume of the flow of the stream including a minimum of one third of the surface as measured from shore to shore shall not be raised to more than 5°F over the temperature that existed before the addition of heat of artificial origin or to a maximum of 86°F whichever is less,[‡] except during periods of the year when stream temperatures are below 39°F. A greater than 5°F increase may be authorized under "Additional limitations or modifications", section 704.2, *infra.* For the protection of the aquatic biota from severe temperature changes, routine shut down of an entire thermal discharge at any site should not be scheduled during the period from December through March.

(ii) *Trout waters.* No discharges at a temperature over 70°F will be permitted at any time to streams classified for trout. From June through September, no discharges at any temperature will be permitted that will raise the temperature of the stream more than 2°F over that which existed before the addition of heat of artificial origin. From October through May, no discharges at any temperature will be permitted that will raise the temperature of the stream more than 5°F over that which existed before the addition of heat of artificial origin or to a maximum of 50°F whichever is less.

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[*] The waters of Long Island Sound and its bays or portions thereof have characteristics of either coastal waters and/or estuaries. The criteria to be applied to any particular project will depend upon the site location and all other relevant facts. The applicable criteria will be determined as provided in subdivisions (a) and (b) of section 704.2, *infra.*

[‡] It is recognized that because of widely varying conditions in streams and estuaries, the commissioner will establish, where necessary to meet the standards for thermal discharges, a lower maximum surface water temperature and a greater zone of passage under the procedures set forth in "Additional limitations or modifications", section 704.2, *infra.*

(2) *Lakes.* The water temperature at the surface of a lake shall not be raised more than 3°F over the temperature that existed before the addition of heat of artificial origin, except that within a radius of 300 feet or equivalent area[3] from the point of discharge, this temperature may be exceeded. In lakes subject to stratification, the thermal discharges shall be confined to the epilimnetic area.

(3) *Coastal waters.* The water temperature at the surface of coastal waters shall not be raised more than 4°F over the monthly means of maximum daily temperatures from October through June nor more than 1.5°F from July through September except that within a radius of 300 feet or equivalent area[*] from the point of discharge this temperature may be exceeded.

(4) *Estuaries or portions of estuaries.* The water temperature at the surface of an estuary shall not be raised to more than 90°F at any point provided further, at least 50 percent of the cross sectional area and/or volume of the flow of the estuary including a minimum of one third of the surface as measured from water edge to water edge at any stage of tide, shall not be raised to more than 4°F over the temperature that existed before the addition of heat of artificial origin or a maximum of 83°F, whichever is less.[‡] However, during July through September if the water temperature at the surface of an estuary before the addition of heat of artificial origin is more than 83°F, an increase in temperature not to exceed 1.5°F, at any point of the estuarine passageway as delineated above, may be permitted.

Historical Note

Sec. added, filed Aug. 12, 1969 eff. Aug. 12, 1969.

704.2 Additional limitations or modifications. (a) The Commissioner of Health may impose limitations and/or conditions in addition to the stated criteria where he determines, in the exercise of his discretion, that such additional limitations and/or conditions are necessary to maintain the quality of the receiving waters for the best usage classifications and standards assigned by the Water Resources Commission pursuant to Public Health Law, article 12, section 1205.

(b) The commissioner may authorize a conditional modification of the stated criteria upon application. Upon receipt of such application the commission shall confer with the Federal Water Pollution Control Administration and shall transmit to that agency information to enable the Secretary of the Interior to fulfill his responsibilities under Federal law. The applicant shall have the burden of establishing to the satisfaction of the Commissioner of Health that one or more of the criteria are unnecessarily restrictive as to a particular project in that a modification of such criterion, or criteria, as the case may be, would not impair the quality of the receiving waters so as to adversely affect them for the best usage classifications and standards assigned by the Water Resources Commission. The commissioner may, when he determines it to be in the public interest, hold a public hearing upon the application.

(c) Any such modification shall be conditioned upon post-operational experience. Plans for additional treatment of, or change in, the thermal discharge shall be developed and submitted as part of the application to the commissioner which shall be implemented upon order of the commissioner in the event that post-operational experience shows a trend toward impairment by the discharge of the quality of the receiving waters for the assigned best usage classifications and standards.

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[*] It is recognized that a radius of 300 feet or equivalent area may be too liberal or too restrictive and that a lesser or greater area may be required or permitted under the procedures set forth in "Additional limitations or modifications", section 701.2, *infra.*

[‡] It is recognized that because of widely varying conditions in streams and estuaries, the commissioner will establish, where necessary to meet the standards for thermal discharges, a lower maximum surface water temperature and a greater zone of passage under the procedures set forth in "Additional limitations or modifications", section 704.2, *infra.*

Historical Note

Sec. added, filed Aug. 12, 1969 eff. Aug. 12, 1969.

704.3 **Rules and regulations.** The commissioner may adopt rules and regulations with the approval of the Water Resources Commission governing the procedures prescribed or authorized herein. Such rules and regulations may include the methods and procedures for the making of tests and analytical determinations hereunder and the notice and hearing procedure to be followed in administering section 704.2, *supra*.

Historical Note

Sec. added, filed Aug. 12, 1969 eff. Aug. 12, 1969.

704.4 **Extent of applicability of criteria to existing discharges.** (a) In determining whether a discharge existing prior to the adoption of the above criteria complies with the applicable standard for thermal discharges ("None alone or in combination with other substances or wastes in sufficient amounts or at such temperature as to be injurious to fish life . . . or impair the waters for any other best usage . . ." [6 NYCRR 701.3 *et seq.*]), these criteria are intended only to be a frame of reference.

(b) Moreover, the procedures described in Public Health Law, section 1223, shall apply in any application of the criteria to discharges existing prior to the adoption of these criteria without regard to whether such discharges began prior to or subsequent to the enactment of this State's Water Pollution Control Act (now Public Health Law, article 12).

Historical Note

Sec. added, filed Aug. 12, 1969 eff. Aug. 12, 1969.

STATE OF CONNECTICUT
WATER RESOURCES COMMISSION
STATE OFFICE BUILDING ● HARTFORD, CONNECTICUT 06115

WATER QUALITY CRITERIA

GENERAL POLICY

1. Water quality standards adopted on the basis of these criteria are in accord with all the requirements of Section 25-54e of the 1957 Supplement to the General Statutes.

2. In the discharge of waste treatment plant effluent and cooling waters to the receiving waters, cognizance shall be given both in time and distance to allow for mixing of effluent and stream. Such distances required for complete mixing shall not affect the water usage Class adopted but shall be defined and controlled by the Commission.

3. Recommendations on other waste parameters will constitute a portion of the continuing effort of the Commission in further defining interstate and intrastate water quality standards. The Commission reserves the right to amend or extend the following criteria as improved standard methods are developed or revisions consistent with the enhancement of water quality are justified.

4. Coastal and marine waters are those generally subject to the rise and fall of the tide.

5. Interstate waters whose existing quality is better than the established standards as of the date which such standards become effective will be maintained at their existing high quality. These and other interstate waters of the State will not be lowered in quality unless and until it has been affirmatively demonstrated to the Commission and the Department of the Interior that such change is justifiable as a result of necessary economic or social development and will not interfere with or become injurious to any assigned uses made of, or presently possible in, such waters. This will require that any industrial, public or private project or development which would constitute a new source of pollution or an increased source of pollution to high quality waters will be required, if provided a permit, as part of the initial project design, to provide the highest and best degree of waste treatment available under existing technology, and, since for interstate waters these are also Federal standards, these waste treatment requirements will be developed cooperatively.

NOTES

1. These criteria do not apply to conditions brought about by natural causes.

2. Class D waters will be assigned only where a higher water use Class cannot be attained after all appropriate waste treatment methods are utilized.

3. All sewage treatment plant effluents shall receive disinfection before discharge to the watercourse. The degree of treatment and disinfection shall be as required by the State.

4. Waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life for the appropriate, most sensitive and governing water class use. In areas where fisheries are the governing considerations and approved limits have not been established, bioassays shall be performed as required by the appropriate agencies. For public drinking water supplies the raw water sources must be of such a quality that United States Public Health Service limits, or State limits if more stringent, for finished water can be met after conventional water treatment.

5. Radioactivity limits to be approved by the appropriate State agency with consideration of possible adverse effects in downstream waters from discharge of radioactive wastes; limits in a particular watershed to be resolved when necessary after consultation between appropriate State and Federal agencies. In no case shall the Alpha emitters exceed a concentration of 3 picocuries per liter or the Gross Beta emitters exceed a concentration of 1000 picocuries per liter.

6. Sludge deposits, floating solids, oils, grease and scum shall not be allowed except for such small amounts that may result from the discharge of appropriately treated sewage or industrial waste effluents.

7. The minimum average daily flow for seven consecutive days that can be expected to occur once in ten years shall be the minimum flow to which the standards apply.

8. Class B and C waters shall be substantially free of pollutants that: a) unduly affect the composition of bottom fauna; b) unduly affect the physical or chemical nature of the bottom; c) interfere with the propagation of fish.

9. Class A waters reserved for water supply may be subject to restricted use by State and Local regulation.

10. All interstate Class A waters and all interstate Class B waters, except Shetucket River from confluence of Willimantic and Natchaug Rivers to Greenville Dam, Norwich, are considered to be suitable for cold water fish spawning and growth.

11. The criteria for dissolved oxygen and allowable temperature increase for interstate Class B and Cc waters are applicable to waters used only for fish passage. When such class waters are suitable for cold water fish spawning and growth, these criteria shall be the same as those specified for Class A waters.
12. In the case of interstate Class B and Cc waters where parts of such waters are not suitable for spawning and growth, the requirements for fish passage shall be considered with other sensitive uses in defining allowable temperature increases.

COASTAL AND MARINE WATERS

CLASS SA

Suitable for all sea water uses including shellfish harvesting for direct human consumption (approved shellfish areas), bathing, and other water contact sports.

1.	Dissolved oxygen	Not less than 6.0 mg/l at any time
2.	Sludge deposits - solid refuse - floating solids, oils, and grease - scum	None allowable
3.	Color and turbidity	None in such concentrations that will impair any usages specifically assigned to this Class
4.	Coliform bacteria per 100 ml	Not to exceed a median MPN of 70 and not more than 10% of the samples shall ordinarily exceed an MPN of 230 for a 5-tube decimal dilution or 330 for a 3-tube decimal dilution (See Note S.5)
5.	Odor	None allowable
6.	pH	6.8 - 8.5
7.	Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 85° F or in any case raise the normal temperature of the receiving water more than 4° F
8.	Chemical constituents	None in concentrations or combinations which would be harmful to human, animal, or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the waters for any other uses.
9.	Radioactivity	(See Note S.6)

CLASS SB

Suitable for bathing, other recreational purposes, industrial cooling and shellfish harvesting for human consumption after depuration; excellent fish and wildlife habitat; good aesthetic value.

1. Dissolved oxygen	Not less than 5.0 mg/l at any time
2. Sludge deposits - solid refuse - floating solids, oils and grease - scum	None except that amount that may result from the discharge from a waste treatment facility providing appropriate treatment
3. Color and turbidity	None in such concentrations that would impair any usages specifically assigned to this Class
4. Coliform bacteria per 100 ml	Not to exceed a median value of 700 and not more than 2300 in more than 10% of the samples (See Note S.5)
5. Taste and odor	None in such concentrations that would impair any usages specifically assigned to this Class and none that would cause taste and odor in edible fish or shellfish
6. pH	6.8 - 8.5
7. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 85° F or in any case raise the normal temperature of the receiving water more than 4° F.
8. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal, or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, or impair the water for any other usage assigned to this Class
9. Radioactivity	(See Note S.6)

CLASS SC

Suitable fish, shellfish and wildlife habitat; suitable for recreational boating and industrial cooling, good aesthetic value.

1. Dissolved oxygen	Not less than 5 mg/l for more than 6 hours during any 24-hour period and at no time less than 4 mg/l. For cold water fishery, SCc, not less than 5 mg/l at any time
2. Sludge deposits - solid refuse - floating solids, oils and grease - scum	None except that amount that may result from the discharge from a waste treatment facility providing appropriate treatment
3. Color and turbidity	None in such concentrations that would impair any usages specifically assigned to this Class
4. Coliform bacteria per 100 ml	Not to exceed an average in any 30-day period of 5000 nor exceed this value in more than 20% of the samples collected during the period.
5. Taste and odor	None in such concentrations that would impair any usages specifically assigned to this Class and none that would cause taste and odor in edible fish or shellfish
6. pH	6.5 - 8.5
7. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 85° F or in any case raise the normal temperature of the receiving water more than 4° F
8. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal, or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, or impair the water for any other usage assigned to this Class
9. Radioactivity	(See Note S.6)

NOTES

S.1 All sewage treatment plant effluents shall receive disinfection before discharge to coastal and marine waters. The degree of treatment and disinfection shall be as required by the State.

S.2 These criteria do not apply to conditions brought about by natural causes.

S.3 The waters shall be substantially free of pollutants that will: a) unduly affect the composition of bottom fauna, b) unduly affect the physical or chemical nature of the bottom; c) interfere with the propagation of fish.

S.4 These criteria shall apply at all times in coastal and marine waters.

S.5 Surveys to determine coliform concentrations shall include those areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions.

S.6 The discharge of radioactive materials in concentrations or combinations which would be harmful to human, animal or aquatic life shall not be allowed. In no case shall the Alpha emitters exceed a concentration of 3 picocuries per liter or the Gross Beta emitters exceed a concentration of 1000 picocuries per liter.

S.7 All interstate Class SA waters and all interstate Class SB waters, except Housatonic River from Derby Dam to mouth, Connecticut River from Hurd State Park in East Hampton to mouth, and Shetucket and Thames Rivers from Greenville Dam, Norwich, to mouth, are considered to be suitable for cold water fish spawning and growth.

S.8 The criteria for dissolved oxygen and allowable temperature increase for interstate Class SB and SCc waters are applicable to waters used only for fish passage. When such waters are suitable for cold water fish spawning and growth, these criteria shall be the same as those specified for Class SA waters.

S.9 In the case of interstate Class SB and SCc waters where parts of such waters are not suitable for spawning and growth, the requirements for fish passage shall be considered with other sensitive uses in defining allowable temperature increases.

APPENDIX E

FEDERAL WATER QUALITY ADMINISTRATION SURVEY OF
LONG ISLAND SOUND
SEPTEMBER - OCTOBER 1969

STATION DESCRIPTION
ENVIRONMENTAL PROTECTION AGENCY
LONG ISLAND SOUND SURVEY
SEPTEMBER - OCTOBER 1969

Station	Description	Station	Description
1	Whitestone Bridge	36	Near Orchard Beach
2	Throggs Neck Bridge	37	New Rochelle Outfall
3	Near Stepping Stones	38	Larchmont Harbor
4	Near City Island	39	Mouth of Larchmont Harbor
5	Near Execution Rocks	40	Mamaroneck Harbor
6	Outside Mamaroneck Harbor	41	Mamaroneck Outfall
7	Off Fox Point	42	Off Peningo Neck
8	Near Great Captain Island	43	Blind Brook Outfall
9	Off Lloyd Point	44	Port Chester Harbor
10	Outside Cove Harbor	45	Near Bluefish Shoal
11	Off Eatons Neck	46	Captain Harbor
12	Off Norwalk Islands	47	Greenwich Harbor
13	Outside Smithtown Bay	48	Stamford Harbor
14	Outside Bridgeport Harbor	49	Mouth Stamford Harbor
15	Outside Mt. Sinai Harbor	50	Darien River
16	Off Pond Point	51	Norwalk Harbor Entrance Channel
17	Off Herod Point	52	Saugatuck River
18	Outside Branford Harbor	53	Southport Harbor
19	Off Jacobs Point	54	Black Rock Harbor
20	Off Orient Point	55	Off Bridgeport
21	Off Hatchett Point	56	Bridgeport Harbor
22	Near The Race	57	Housatonic River
23	Outside New London Harbor	58	Mouth Housatonic River
24	Little Neck Bay	59	Mouth Milford Harbor
25	Manhasset Bay	60	New Haven Harbor
26	Hempstead Harbor	61	Mouth New Haven Harbor
27	Matinecock Point	62	Branford Harbor
28	Oyster Bay	63	The Thimbles
29	Huntington Bay	64	Guilford Harbor
30	Nissequoque River	65	Clinton Harbor
31	Stony Brook	66	Connecticut River
32	Port Jefferson Harbor	67	Mouth Connecticut River
33	Inlet Point	68	New London Harbor
34	Fishers Island	69	Mouth New London Harbor
35	Eastchester Bay		

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, SEPT. 29-OCT. 3, 1969

Station	Depth Feet	Water Temp. °C	Conductivity umhos	Salinity g/1	Chloride mg/1	DO mg/1	Percent Sat.	BOD mg/1	TOC mg/1	Turbidity ppm	NO_3-N mg/1	PO_4-P mg/1	Chlorophyll a mg/m^3	Total Coliform/100 ml	Fecal Coliform/100 ml
1-S	10.0	19.8	34.300	24.3	14,600	4.6	58.9	3.0	6	1.0	0.25	.36	4.4	27,000	5,600
1-D	64.0	19.9	34,800	24.7	14,800	4.8	61.7	2.6	3	2.0	0.23	.36	-	15,000	3,500
2-S	10.0	19.8	34,800	24.7	14,100	4.8	61.1		3	1.0	0.24	.33	7.2	18,000	6,600H
2-D	57.0	19.8	35,000	24.7	14,500	5.1	65.2	2.0	3	2.0	0.22	.36	-	14,000	3,300
3-S	10.0	19.7	35,200	24.9	15,000	5.7	64.9	3.0	4	1.0	0.21	.29	7.75	3.000	640
3-D	58.0	19.8	35,200	25.1	14,600	5.5	70.4	1.5	5	1.0	0.22	.29		2,800	480
4-S	5.0	19.6	35.100	25.0	14,600	6.1	77.8		4	1.0	0.20	.29	8.3	600	140
4-D	70.0	19.9	35,300	25.3	14,800	5.6	72.0		3	1.0	0.21	.29	-	150	50
5-S	5.0	19.9	36,100	25.7	14,800	7.3	102.0	3.1	6	1.0	0.18	.26	14.5	28L	02L
5-D	60.0	19.9	36,200	25.7	14,700	6.8	76.9		3	1.0	0.17	.23	-	290	40
6-S	5.0	19.9	36,500	26.0	14,800	7.4	77.7		5	1.0	0.15	.16	-	06L	02
6-D	41.0	19.9	36,700	26.1	14,500	6.4	84.7		2	1.0	0.17	.20	-	08L	02L
7-S	5.0	19.9	36,600	26.0	14,300	7.8	99.7	1.5	3	1.0	0.16	.23	9.0	02L	02
7-D	45.0	19.9	36,800	26.2	14,600	7.0	89.8		3	1.0	0.17	.20	-	02L	02
8-S	5.0	20.1	37,200	26.5	14,600	7.4	95.3		3	1.0	0.16	.20	-	02	02
8-D	41.0	20.0	36,900	26.3	14,900	7.1	91.6		4	1.0	0.15	.20	-	02	02
9-S	5.0	20.0	37,000	26.3	15,000	7.5	96.9		3	1.0	0.18	.20	-	02	02
9-D	32.0	20.0	36,900	26.3	15,000	6.9	89.1		4	1.0	0.17	.16	-	02	02
10-S	5.0	20.1	37,200	26.5	15,000	7.5	97.1	1.4	3	2.0	0.14	.16	8.8	02L	02
10-D	72.0	20.1	37,400	26.5	15,100	6.3	81.6		2	3.0	0.15	.13	-	02L	02L
11-S	5.0	19.6	37,100	26.6	15,300	7.1	91.4		9	1.0	0.14	.13	-	02	02
11-D	49.0	19.9	37,100	26.5	15,200	6.5	84.0		3	1.0	0.14	.13	-	02	02
12-S	5.0	19.8	37,500	26.8	15,000	7.0	90.1	1.2	9	1.0	0.13	.13	6.4	02	02
12-D	63.0	19.7	37,400	26.9	15,200	6.5	83.7		4	1.0	0.13	.13	-	02	02
13-S	5.0	19.9	37,200	26.6	15,500	6.9	89.5	1.1	9	1.0	0.14	.13	3.6	02	02
13-D	100.0	20.0	38,000	27.0	15,700	6.1	79.5		2	1.0	0.15	.10	-	02	02
14-S	5.0	20.0	37,500	26.9	15,000	6.5	84.0		2	1.0	0.15	.13	-	02	02
14-D	56.0	20.0	37,600	26.8	15,200	6.5	84.2		3	1.0	0.19	.13	-	02L	02

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, SEPT. 29-OCT. 3. 1969 (Cont'd.)

Station	Depth Feet	Water Temp. °C	Conductivity umhos	Salinity g/1	Chloride mg/1	DO mg/1	Percent Sat.	BOD mg/1	TOC mg/1	Turbidity ppm	NO_3-N mg/1	PO_4-P mg/1	Chlorophyll a mg/m^3	Total Coliform/100 ml	Fecal Coliform/100 ml
15-S	5.0	20.2	37,600	26.8	15,700	7.3	95.5		2	1.0	0.12	.13	-	02	02
15-D	100.0	20.0	37,900	27.2	16,000	6.4	83.7		16	1.0	0.12	.10	-	02	02
16-S	5.0	19.8	37,700	26.8	15,600	6.8	88.2	.8	3	1.0	0.15	.13	2.6	02	02
16-D	50.0	19.7	37,600	26.7	15,700	6.5	84.2		2	1.0	0.14	.10	-	02	02
17-S	5.0	19.9	38,300	27.4	15,400	7.4	95.9	.9	5	1.0	0.13	.10	2.8	02	02
17-D	90.0	19.5	38,100	27.6	14,600	6.7	85.3		3	1.0	0.12	.10	-	02	02
18-S	5.0	19.5	37,300	27.0	14,600	7.6	96.8		3	1.0	0.13	.13	-	02	02
18-D	48.0	19.3	32,200	27.0	14,900	6.9	87.8		3	1.0	0.14	.13	-	02	02
19-S	5.0	19.7	37,900	27.1	15,700	7.6	98.5		2	1.0	0.10	.10	-	02	02
19-D	76.0	19.7	3[illegible],900	27.1	15,400	7.1	91.6		3	1.0	0.10	.10	-	02	02
20-S	5.0	18.8	38,300	28.0	16,300	7.5	96.2		2	1.0	0.07	.10	-	02	02
20-D	100.0	18.4	38,900	28.8	16,400	7.1	90.5		3	1.0	0.07	.03	-	02	02
21-S	5.0	18.2	39,000	28.9	16,700	7.5	95.6	1.0	2	1.0	0.08	.03	3.4	02	02
21-D	45.0	18.0	39,200	29.2	16,900	7.3	92.9		3	1.0	0.08	.03	-	02	02
22-S	5.0	18.1	38,800	28.8	16,800	7.5	95.5	.6	2	1.0	0.08	.03	3.3	02	02
22-D	100.0	17.8	39,200	29.4	16,800	7.3	92.4		2	1.0	0.06	.03	-	02	02
23-S	5.0	18.3	39,400	29.1	17,100	7.7	98.8		2	1.0	0.08	.03	-	02	02
23-D	60.0	18.2	39,300	29.2	17,600	7.4	94.6		2	1.0	0.07	.03	-	02	02
24-S	8.5	19.6	34,700	24.7	14,400	5.1	64.9		4	1.0	0.20	.36	4.65	12,000	4,200
25-S	5.0	19.8	35,300	25.0	14,200	6.2.	79.0	2.0	5	1.0	0.20	.29	7.6	180	12L
26-S	5.0	19.8	35,700	25.3	15,700	8.7	112.9	3.7	4	1.0	0.15	.20	18.6	04L	02L
26-D	27.0	19.5	35,500	25.5	14,600	8.2	104.4		4	1.0	0.18	.23	-	04L	02
27-S	5.0	19.7	36,000	25.6	14,700	7.7	98.5	2.3	4	1.0	0.20	.20	10.7	04	04
28-S	5.0	19.8	36,400	26.2	15,100	7.9	101.8	2.0	4	1.0	0.14	.20	7.6	02L	02
28-D	20.0	19.6	36,500	25.8	14,900	7.1	90.9		7	1.0	0.14	.20	-	02	02
29-S	5.0	18.6	35,500	25.8	14,500	7.8	97.4	1.2	3	1.0	0.22	.16	7.6	02L	02
29-D	25.0	18.8	35,600	25.9	14,600	7.5	94.2		3	1.0	0.12	.16	-	02L	02
30-S	5.0	19.7	36,800	26.5	15,300	8.9	93.7		12	1.0	0.10	.16	19.7	02	02

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, SEPT. 29-OCT. 3, 1969 (Cont'd.)

Station	Depth Feet	Water Temp. °C	Conductivity umhos	Salinity g/1	Chloride mg/1	DO mg/1	Percent Sat.	BOD mg/1	TOC mg/1	Turbidity ppm	NO_3-N mg/1	PO_4-P mg/1	Chlorophyll a mg/m	Total Coliform/100 ml	Fecal Coliform/100 ml
31-S	5.0	19.6	36,700	26.2	15,500	8.6	110.9		[illegible]	1.0	0.14	.13	-	04L	02
32-S	5.0	19.9	37,100	26.4	15,600	9.2	119.5	2.3	3	1.0	0.08	.13	18.6	50	04L
32-D	33.0	20.2	37,100	26.4	16,200	9.4	123.7		12	1.0	0.09	.13	-	18L	06L
33-S	5.0	18.9	38,100	27.7	15,900	7.7	98.5	1.2	4	1.0	0.11	.07	7.1	22L	08L
33-D	19.0	18.9	38,200	28.0	15,800	7.5	95.8		2	1.0	0.07	.07	-	16L	02L
34-S	5.0	18.0	39,200	29.3	16,800	7.6	96.8		2	1.0	0.08	.03	-	02	02
34-D	24.0	18.0	39,200	29.4	17,000	7.5	95.5		2	1.0	0.08	.03	-	02L	02
35-S	5.5	18.4	34,000	24.7	14,300	8.0	99.3	4.2	4	1.0	0.21	.26	19.68	210	32L
36-S	5.0	20.0	35,500	25.0	14,500	6.6	84.7	1.9	5		0.19	.29	-	390	80
37-S	5.0	19.7	35,400	25.3	14,600	7.7	98.4	3.3	2		0.19	.23	22.1	100	38L
37-D	21.0	19.5	35,700	25.3	14,700	6.1	77.7		6		0.18	.23	-	2,800	230
38-S	5.0	20.1	35,300	25.0	14,600	7.7	99.2	3.9	2		0.14	.20	52.1	320	40L
39-S	5.0	19.7	35,500	25.3	14,400	8.0	102.0	3.4	2		0.18	.26	-	420	230
39-D	26.0	19.7	36,000	25.7	14,800	6.0	76.9		2		0.17	.26	-	1,200	380
40-S	5.0	19.5	34,800	24.7	14,500	5.6	72.2	2.5	2		0.14	.23	15.0	420	180
41-S	5.0	19.6	35,400	25.3	14,200	7.9	100.3	3.4	2		0.17	.26	29.0	4,000	640
41-D	39.0	19.7	36,800	26.3	14,200	5.5	69.9		2		0.14	.20	-	120L	12L
42-S	5.0	19.5	36,000	25.8	14,800	7.3	93.2	2.4	2		0.16	.23	-	2,500	410
42-D	39.0	19.5	36,600	26.3	15,200	5.6	69.4		2		0.14	.16	-	130	46
43-S	5.0	19.6	36,100	25.8	15,100	7.5	96.3	2.2	3		0.14	.23	24.3	220	56
43-D	37.0	19.7	36,700	26.1	15,100	5.4	69.4		3		0.13	.20	-	08L	02L
44-S	5.0	19.5	35,700	25.7	14,800	6.3	80.4	2.0	2		0.13	.23	18.6	14,000	2,100
45-S	5.0	19.7	36,200	25.9	14,900	7.5	96.2	2.5	2		0.14	.20	-	100	28L
45-D	34.0	19.6	36,500	26.3	14,800	6.8	86.9		4		0.13	.16	-	28L	02
46-S	5.0	19.4	36,500	26.3	14,700	7.4	94.1	1.6	5		0.13	.20	15.2	92	36L
47-S	5.0	19.2	35,800	25.7	14,400	6.4	80.8	3.5	2		0.11	.33	18.6	18,000	9,800
48-S	5.0	19.6	36,700	26.3	14,900	6.8	87.1	2.4	3		0.10	.20	14.9	15.000	8,900H
48-D	17.0	19.5	36,700	26.3	15,100	7.2	92.2		2		0.12	.16	-	7,600	3,600

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, SEPT. 29-OCT. 3, 1969 (Cont'd.)

Station	Depth Feet	Water Temp. °C	Conductivity umhos	Salinity g/l	Chloride mg/l	DO mg/l	Percent Sat.	BOD mg/l	TOC mg/l	Turbidity ppm	NO_3-N mg/l	PO_4-P mg/l	Chlorophyll a mg/-	Total Coliform/100 ml	Fecal Coliform/100 ml
49-S	5.0	19.4	36,700	26.4	15,200	7.7	98.6	1.8	4		0.10	.16	14.9	960	260
49-D	20.0	19.4	36,700	26.3	15,200	7.6	97.3		2		0.12	.16	-	1,100	230
50-S	5.0	19.4	36,800	26.5	15,600	7.7	99.0	1.5	3		0.11	.16	13.6	04	02
51-S	5.0	18.9	36,300	26.6	15,400	7.2	91.5	1.0	2		0.10	.16	8.0	36L	24L
52-S	5.0	18.9	36,300	26.3	15,300	8.9	113.0	2.5	3		0.08	.13	12.2	02L	02
53-S	5.0	19.3	36,900	26.2	13,300	9.6	119.8	2.3	3		0.09	.13	11.6	04L	02
54-S	5.0	19.5	36,600	26.3	15,100	5.3	67.9	2.3	2		0.14	.20	11.6	2,400	230
54-D	15.0	19.3	36,800	26.5	15,700	5.5	70.7		3		0.12	.16	-	130	22L
55-S	5.0	19.9	37,100	26.5	15,500	7.4	96.0	1.5	2		0.12	.16	10.2	2,900	210
55-D	17.0	19.6	37,000	26.6	15,300	7.4	95.2		3		0.15	.13	-	1,400	120
56-S	5.0	21.6	37,400	25.8	14,800	5.9	78.4	1.9	2		0.15	.23	8.0	>30,000	2,300
56-D	32.0	19.9	37,000	26.2	15,000	6.3	81.2		2		0.11	.16	-	140	18L
57-S	5.0	20.3	26,000	17.7	10,500/10,300	5.5	55.4	2.3	3	2.0	0.32	.23	9.2	2,200	100
57-D	22.0	19.7	33,300	23.5	13,900	5.7	72.2		3	1.0	0.19	.16	-	760	30L
58-S	5.0	19.1	35,300	25.5	14,400	6.2	78.1	1.4	2	1.0	0.18	.13	-	480	32L
58-D	15.0	19.3	36,600	26.6	15,500	6.8	87.2		2	1.0	0.14	.13	6.4	26L	14L
59-S	5.0	19.3	35,800	25.9	14,000	5.1	64.2	1.0	3	2.0	0.22	.36	5.1	160	40
60-S	5.0	18.5	35,000	25.6	14,400	4.0	49.8	2.7	3	2.0	0.19	.29	4.0	100,000H	36,000H
60-D	34.0	18.5	36,000	26.5	15,200	6.0	75.4		3	2.0	0.14	.16	-	660	100
61-S	5.0	18.2	35,600	26.2	15,100	6.1	76.1	.9	3	1.0	0.13	.16	2.4	2,600	310
61-D	33.0	18.3	35,900	26.5	15,800	6.3	79.5		1	1.0	0.17	.16	-	1,800	210
62-S	5.0	19.0	36,600	26.6	15,300	6.9	83.9	1.3	2	3.0	0.12	.13	5.4	12L	12L
63-S	5.0	18.8	37,000	26.9	15,800	6.9	87.9	1.1	2	2.0	0.12	.13	5.1	08L	02
64-S	5.0	18.8	37,300	27.0	15,900	7.0	89.3	.9	2	4.0	0.11	.13	4.4	04L	02
65-S	5.0	18.6	37,700	27.5	16,700	7.6	97.6	1.1	2	3.0	0.10	.07	4.9	02L	02
66-S	5.0	18.2	37,900	28.2	14,700	7.3	90.7	.8	3	3.0	0.12	.07	5.3	40	06L
67-S	5.0	18.0	37,200	27.4	16,400	7.4	92.5	.8	3	5.0	0.10	.10	5.4	04L	02
68-S	5.0	18.3	37,600	27.8	16,100	5.1	64.6	>5.1	4	1.0	0.12	.07	5.6	4,000	1,200
68-D	34.0	17.8	39,000	29.4	16,700	6.8	85.9		2	1.0	0.07	.03	-	600	260
69-S	5.0	18.0	39,250	29.4	19,000	7.6	93.2	.7	2	1.0	0.09	.03	3.3	48L	02L
69-D	31.0	17.9	39,200	29.4	15,800	7.6	96.4		2	1.0	0.07	.03	-	60L	06L

APPENDIX F

FEDERAL WATER QUALITY ADMINISTRATION SURVEY OF NORTH SHORE OF LONG ISLAND SOUND

JULY 1970

STATION DESCRIPTION
ENVIRONMENTAL PROTECTION AGENCY
LONG ISLAND SOUND SURVEY
JULY 1970

Station	Location	Sampling Depth, A (MLW)
NS1	Throggs Neck Bridge	5
2	Off Stepping Stones	5
2A	Off Hewlett Pt.	5
3	Eastchester Bay	4
4	" "	3
5	Hutchinson River	3
6	Off Orchard Beach	5
7	Off Glen Island	5
8	Echo Bay	5
9	Larchmont Harbor	5
9A	Larchmont Harbor	1
10	Mamaroneck Harbor	5
10A	Milton Harbor	3
11	Mamaroneck Harbor	5
12	Off Peningo Neck	5
13	Off Rye Beach	5
14	Byram River	5
15	Portchester Harbor	5
16	Captain Harbor	5
17	Greenwich Harbor	5
18	Captain Harbor	5
19	Cos Cob Harbor	3
20	" " "	3
21	Greenwich Cove	5
22	Off Greenwich Pt.	5
23	Stamford Harbor	5
24	" "	5
25	Stamford Harbor (W. Branch)	5
26	Stamford Harbor (E. Branch)	5
27	Westcott Cove	5
28	Cove Harbor	5
29	Off Smith Reef	5
30	Sheffield Harbor	5
31	Five Mile River	5
32	Sheffield Harbor	5
33	" "	5
34	Norwalk River	5
35	Cockenoe Harbor	5
36	Saugatuck River	5
37	" "	5

List and Location of Sampling Stations

Station	Location	Sampling Depth, A (MLW)
38	Off Frost Pt.	5
39	Southport Harbor	5
40	Off Pine Creek Pt.	5
41	Black Rock Harbor	5
42	Ash Creek	3
43	Cedar Creek	5
44	Bridgeport Harbor	5
45	Yellow Mill Cannel	5
46	Bridgeport Harbor	5
47	" "	5
48	" "	5
49	Off Lordship Beach	5
50	Housatonic River (mouth)	5
51	Housatonic River	5
52	" "	5
53	" "	5
54	" "	5
55	Off Charles Island	5
56	The Gulf	5
57	Milford Harbor	5
58	Off Pond Pt.	5
59	Off Oyster R. Pt.	5
60	Off New Haven Harbor	5
61	Off West Haven	5
62	West River	5
63	Quinnipaic River	2
64	" "	5
65	New Haven Harbor	5
66	" " "	5
67	" " "	5
68	Off Lighthouse Pt.	5
69	New Haven Harbor Ent. Ch.	5
70	Branford Harbor	5
71	Branford River	5
72	N.W. of the Thimbles	5
73	Off Sachem Head	5
74	Guildford Island	4
75	Madison Reef	5
76	Clinton Harbor	5
77	" "	4
78	Duck Island Roads	5
79	Patchogue River	5
80	Westbrook Harbor	5
81	Off Cornfield Pt.	5
82	Connecticut River (mouth)	5

List and Location of Sampling Stations

Station	Location	Sampling Depth, A (MLW)
83	Connecticut River (mouth)	5
84	Connecticut River	5
85	" "	5
86	Off Sound View	5
87	Off Giants Neck	5
88	Off Black Pt.	5
89	Niantic Bay	5
90	Niantic River	5
91	Jordan Cove	5
92	Off Goshen Pt.	5
93	New London Harbor	5
94	" " "	5
95	" " "	5
97	" " "	5
98	Thames River	5
99	" "	5
100	" "	5
101	" "	5
102	" "	5
103	" "	5
104	" "	5
105	Pine Island Channel	5
106	Mumford Cove	5
107	Fishers Island Sound	5
108	Bebee Cove	5
109	Mystic River	5
110	Mystic River	5
111	Fishers Island Sound	5
112	" " "	5
113	Stonington Harbor	5
114	" "	3
115	Off Stonington Pt.	4
116	Little Narragansett Bay	5
117	Pawtucket River	5
118	" "	5

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970

STAT	DATE	TIME	DEPTH	LAB NO. 00008	AIR TEMP CENT 00020	WATER TEMP CENT 00010	DO MG/L 00300	BOD 5 DAY MG/L 00310	PH SU 00400	TURB JKSN JU 00070	COND A-25C UMHOS 00095	SALIN G/L 70305	CL MG/L 00940
NS1	07-19-70	0840	005	2277	N	18.70	2.70	N	7.40	3	37700	24	14700
NS2	07-19-70	0850	005	2278	N	17.90	3.60	N	7.70	2	38400	24	15300
NS2A	07-19-70	0915	005	2279	N	18.40	4.90	N	8.00	2	38600	25	14700
NS3	07-19-70	0945	005	2281	N	18.10	4.30	N	8.00	3	38600	25	15000
NS4	07-19-70	1135	005	2283	28.00	19.80	5.40	N	7.60	5	38400	24	14700
NS5	07-19-70	1120	005	2282	28.00	22.00	0.60	N	8.00	10	36300	23	13300
NS6	07-19-70	0920	005	2280	N	17.60	6.50	N	8.10	2	39300	25	15300
NS7	07-19-70	1000	005	2286	29.00	18.30	5.30	N	7.70	2	38300	24	15100
NS8	07-19-70	0940	005	2285	N	18.30	6.10	2.20	7.70	2	38200	24	15000
NS9	07-19-70	1030	005	2287	30.50	17.60	6.20	N	8.00	2	38700	25	14700
NS9A	07-19-70	1045	005	2288	26.90	18.10	9.80	3.20	8.00	3	38500	24	15000
NS10	07-19-70	1115	005	2289	32.00	17.30	5.80	N	8.00	2	38600	25	15300
NS10A	07-19-70	1130	005	2290	N	19.40	N	2.00	8.00	2	38400	24	15100
NS11	07-19-70	1255	005	2291	N	19.80	9.30	3.50	8.10	3	38300	24	14700
NS12	07-18-70	0900	005	2270	N	18.30	6.50	N	7.80	2	39800	25	14300
NS13	07-18-70	0915	005	2271	N	17.40	5.80	N	7.90	2	40000	25	14300
NS14	07-18-70	0940	005	2273	N	18.50	7.20	3.00	8.00	2	40100	25	14400
NS15	07-18-70	0930	005	2272	N	18.00	5.80	N	7.90	2	39800	25	14300
NS16	07-18-70	1030	005	2276	N	17.90	5.[illegible]0	N	8.10	2	40500	26	14900
NS17	07-18-70	1015	005	2275	N	18.60	6.90	N	8.00	3	40000	25	14700
NS18	07-18-70	1000	005	2274	N	15.80	4.60	N	7.70	2	42000	27	15200
NS19	07-18-70	0840	005	2261	38.70	18.90	7.00	N	7.70	2	38700	25	15400
NS20	07-18-70	0820	005	2260	27.70	19.60	6.10	N	7.80	3	38500	24	15100
NS21	07-18-70	0910	005	2262	23.30	18.10	6.10	N	7.70	3	38800	25	15800
NS22	07-18-70	0940	005	2263	33.00	18.70	7.90	N	7.90	3	38900	25	16000
NS23	07-18-70	1005	005	2264	34.50	18.20	7.10	N	7.90	2	39400	25	14700
NS24	07-18-70	1010	005	2265	28.50	18.90	7.00	N	8.00	3	38700	24	15600
NS25	07-18-70	1100	005	2267	39.50	20.30	6.40	3.10	7.70	4	37900	24	14300
NS26	07-18-70	1030	005	2266	34.20	20.50	N	3.30	7.90	5	38400	25	14700
NS27	07-17-70	1410	005	2328	N	18.20	7.20	8.80J	8.50	2	40200	26	15000
NS28	07-17-70	1340	005	2326	N	18.30	7.00	N	8.30	3	40600	26	14500
NS29	07-17-70	1355	005	2327	N	19.50	10.30	N	8.70	3	40100	26	14500
NS30	07-17-70	1250	005	2324	N	19.00	8.10	N	7.90	2	40000	25	14500
NS31	07-17-70	1315	005	2325	N	18.00	7.50	N	8.30	3	40200	25	14500
NS32	07-17-70	0950	005	2318	N	18.50	8.20	N	8.10	4	40500	26	15600
NS33	07-17-70	1045	005	2320	N	21.00	6.10	3.00	8.10	6	39100	25	14500
NS34	07-17-70	1030	005	2319	N	21.40	3.80	3.00	7.10	5	39100	25	14300
NS35	07-17-70	1215	005	2321	N	18.90	6.50	N	8.10	4	40000	25	15300
NS36	07-17-70	1200	005	2323	N	17.60	5.40	N	8.00	5	40200	25	14300
NS37	07-17-70	1140	005	2322	N	21.30	5.50	N	8.00	5	38100	25	14100
NS38	07-17-70	0740	005	2331	25.70	17.30	6.00	N	7.40	2	39100	25	14500
NS39	07-17-70	0725	005	2330	22.50	17.50	6.00	N	7.40	3	38800	25	14300
NS40	07-17-70	0755	005	2332	21.00	16.50	5.50	N	7.70	2	39400	25	15000
NS41	07-17-70	0825	005	2333	21.50	20.30	6.60	N	7.90	2	38700	25	14500
NS42	07-17-70	0845	005	2334	22.50	19.10	5.20	N	7.80	3	38800	25	14300
NS43	07-17-70	0900	005	2335	24.50	19.20	5.10	N	7.70	3	38600	24	14300
NS44	07-17-70	1100	005	2255	30.00	21.80	5.40	1.60J	8.00	2	38100	24	14500
NS45	07-17-70	1040	005	2340	22.50	21.20	6.10	1.90J	7.90	3	38000	24	14500
NS45A	07-17-70	1020	005	2339	26.50	20.80	5.50	N	7.80	3	38400	24	15100

REMARKS-

N=NO DATA AVAILABLE, J=ESTIMATED VALUE, K=LESS THAN, L=GREATER THAN, -=MINUS TEMP

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970

STAT	DATE	TIME	DEPTH	LAB NO. 00008	CHLR-PHL A MG/M3 32230	NO3-N MG/L 00620	T KJL N MG/L 00625	PHS-T P-WET MG/L 00665	T ORG C MG/L 00680	CU UG/L 01040	CR UG/L 01030	ZINC UG/L 01090	LEAD UG/L 01049
NS1	07-19-70	0840	005	2277	3.00	0.18	1.03	0.28	4.00	N	N	N	N
NS2	07-19-70	0850	005	2278	5.80	0.14	1.04	0.23	4.00	N	N	N	N
NS2A	07-19-70	0915	005	2279	7.80	0.14	0.48	0.22	4.00	N	N	N	N
NS3	07-19-70	0945	005	2281	N	0.09	1.00	0.22	4.00	N	N	N	N
NS4	07-19-70	1135	005	2283	13.80	0.12	0.68	0.28	5.00	N	N	N	N
NS5	07-19-70	1120	005	2282	10.60	0.18	1.15	0.52	6.00	N	N	N	N
NS6	07-19-70	0920	005	2280	7.40	0.09	0.88	0.18	4.00	N	N	N	N
NS7	07-19-70	1000	005	2286	11.80	0.09	0.69	0.17	3.00	N	N	N	N
NS8	07-19-70	0940	005	2285	7.30	0.09	0.61	0.16	3.00	N	N	N	N
NS9	07-19-70	1030	005	2287	6.30	0.07	1.43	0.13	3.00	N	N	N	N
NS9A	07-19-70	1045	005	2288	19.10	0.07	0.59	0.11	3.00	N	N	N	N
NS10	07-19-70	1115	005	2289	5.30	0.09	1.31	0.12	2.00	N	N	N	N
NS10A	07-19-70	1130	005	2290	8.80	0.07	0.73	0.13	4.00	N	N	N	N
NS11	07-19-70	1255	005	2291	24.10	0.07	0.96	0.12	4.00	N	N	N	N
NS12	07-18-70	0900	005	2270	8.80	0.07	0.64	0.14	4.00	N	N	N	N
NS13	07-18-70	0915	005	2271	5.60	0.09	0.71	0.12	4.00	N	N	N	N
NS14	07-18-70	0940	005	2273	8.10	0.07	0.74	0.12	4.00	160	100K	50K	300K
NS15	07-18-70	0930	005	2272	8.10	0.07	0.83	0.11	3.00	N	N	N	N
NS16	07-18-70	1030	005	2276	8.60	0.07	1.28	0.11	4.00	N	N	N	N
NS17	07-18-70	1015	005	2275	7.50	0.05	0.66	0.11	4.00	N	N	N	N
NS18	07-18-70	1000	005	2274	5.10	0.05	0.56	0.14	2.00	N	N	N	N
NS19	07-18-70	0840	005	2261	16.00	0.07	0.39	0.12	4.00	N	N	N	N
NS20	07-18-70	0820	005	2260	11.80	0.09	0.74	0.14	4.00	N	N	N	N
NS21	07-18-70	0910	005	2262	6.10	0.07	0.89	0.14	3.00	N	N	N	N
NS22	07-18-70	0940	005	2263	4.50	0.07	0.65	0.13	4.00	N	N	N	N
NS23	07-18-70	1005	005	2264	7.00	0.05	0.22	0.11	4.00	N	N	N	N
NS24	07-18-70	1010	005	2265	7.40	0.05	0.49	0.13	4.00	N	N	N	N
NS25	07-18-70	1100	005	2267	33.30	0.09	N	0.21	5.00	100K	100K	500K	300K
NS26	07-18-70	1030	005	2266	13.00	0.01	0.34	0.22	5.00	200	100K	50	300K
NS27	07-17-70	1410	005	2328	10.90	0.04	N	0.08	4.00	100K	100K	500K	300K
NS28	07-17-70	1340	005	2326	9.20	0.04	0.76	0.07	4.00	N	N	N	N
NS29	07-17-70	1355	005	2327	14.80	0.05	0.86	0.07	4.00	N	N	N	N
NS30	07-17-70	1250	005	2324	8.00	0.04	0.76	0.07	7.00	N	N	N	N
NS31	07-17-70	1315	005	2325	9.20	0.04	0.76	0.08	4.00	N	N	N	N
NS32	07-17-70	0950	005	2318	16.00	0.04	0.18	0.10	6.00	N	N	N	N
NS33	07-17-70	1045	005	2320	10.20	0.08	0.08	0.18	4.00	N	N	N	N
NS34	07-17-70	1030	005	2319	10.50	0.09	0.06	0.20	4.00	N	N	N	N
NS35	07-17-70	1215	005	2321	8.50	0.08	0.10	0.08	4.00	N	N	N	N
NS36	07-17-70	1200	005	2323	7.30	0.04	0.84	0.10	4.00	N	N	N	N
NS37	07-17-70	1140	005	2322	8.40	0.08	0.06	0.12	4.00	N	N	N	N
NS38	07-17-70	0740	005	2331	8.80	0.11	0.94	0.11	4.00	N	N	N	N
NS39	07-17-70	0725	005	2330	13.90	0.06	0.94	0.08	4.00	N	N	N	N
NS40	07-17-70	0755	005	2332	N	N	0.58	0.07	4.00	N	N	N	N
NS41	07-17-70	0825	005	2333	12.00	0.11	3.66	0.10	4.00	N	N	N	N
NS42	07-17-70	0845	005	2334	6.70	0.03	1.02	0.13	5.00	160	100K	500K	300K
NS43	07-17-70	0900	005	2335	51.20	0.08	0.80	0.31	5.00	170	100K	500K	300K
NS44	07-17-70	1100	005	2255	10.90	0.05	0.84	0.12	5.00	120	100K	500K	300K
NS45	07-17-70	1040	005	2340	12.00	0.07	N	0.13	7.00	100K	100K	500K	300K
NS45A	07-17-70	1020	005	2339	14.30	0.08	0.46	0.15	5.00	N	N	N	N

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970

STAT	DATE	TIME	DEPTH	LAB NO.	HG UG/L	TCOLI MPN 100ML	FCOLI MPN 100ML
				00008	71900	31505	31615
NS1	07-19-70	0840	005	2277	N	35000	11000
NS2	07-19-70	0850	005	2278	N	11000	1700
NS2A	07-19-70	0915	005	2279	N	3500	280
NS3	07-19-70	0945	005	2281	N	2400	1300
NS4	07-19-70	1135	005	2283	N	330	130
NS5	07-19-70	1120	005	2282	N	2400L	1600
NS6	07-19-70	0920	005	2280	N	79	33
NS7	07-19-70	1000	005	2286	N	79	23
NS8	07-19-70	0940	005	2285	N	70	70
NS9	07-19-70	1030	005	2287	N	33	33
NS9A	07-19-70	1045	005	2288	N	330	230
NS10	07-19-70	1115	005	2289	N	49	14
NS10A	07-19-70	1130	005	2290	N	46	13
NS11	07-19-70	1255	005	2291	N	170	49
NS12	07-18-70	0900	005	2270	N	330	230
NS13	07-18-70	0915	005	2271	N	1700	220
NS14	07-18-70	0940	005	2273	N	2400	180
NS15	07-18-70	0930	005	2272	N	46	13
NS16	07-18-70	1030	005	2276	N	11	2
NS17	07-18-70	1015	005	2275	N	49	7
NS18	07-18-70	1000	005	2274	N	70	2
NS19	07-18-70	0840	005	2261	N	230	33
NS20	07-18-70	0820	005	2260	N	79	49
NS21	07-18-70	0910	005	2262	N	17	4
NS22	07-18-70	0940	005	2263	N	13	5
NS23	07-18-70	1005	005	2264	N	79	22
NS24	07-18-70	1010	005	2265	N	230	130
NS25	07-18-70	1100	005	2267	2.00K	2300	790
NS26	07-18-70	1030	005	2266	2.00K	4900	490
NS27	07-17-70	1410	005	2328	N	33	8
NS28	07-17-70	1340	005	2326	N	2	2
NS29	07-17-70	1355	005	2327	N	8	8
NS30	07-17-70	1250	005	2324	N	50	2K
NS31	07-17-70	1315	005	2325	N	130	90
NS32	07-17-70	0950	005	2318	N	23	13
NS33	07-17-70	1045	005	2320	N	240	13
NS34	07-17-70	1030	005	2319	N	490	130
NS35	07-17-70	1215	005	2321	N	49	70
NS36	07-17-70	1200	005	2323	N	17	14
NS37	07-17-70	1140	005	2322	N	140	33
NS38	07-17-70	0740	005	2331	N	2	2K
NS39	07-17-70	0725	005	2330	N	110	2K
NS40	07-17-70	0755	005	2332	N	49	2K
NS41	07-17-70	0825	005	2333	N	79	14
NS42	07-17-70	0845	005	2334	2.00K	49	8
NS43	07-17-70	0900	005	2335	2.00K	220	23
NS44	07-17-70	1100	005	2255	N	4900	540
NS45	07-17-70	1040	005	2340	N	790	170
NS45A	07-17-70	1020	005	2339	N	N	N

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970 (Cont'd.)

STAT	DATE	TIME	DEPTH	LAB NO. 00008	AIR TEMP CENT 00020	WATER TEMP CENT 00010	DO MG/L 00300	BOD 5 DAY MG/L 00310	PH SU 00400	TURB JKSN JU 00070	COND A-25C UMHOS 00095	SALIN G/L 70305	CL MG/L 00940
NS46	07-17-70	1010	005	2338	28.00	20.50	5.50	3.60	7.80	3	38400	24	14500
NS47	07-17-70	0950	005	2337	26.80	19.00	6.20	N	7.50	2	38700	25	14500
NS48	07-17-70	0940	005	2336	24.50	17.20	5.00	N	7.90	2	39000	25	14300
NS49	07-17-70	0805	005	2317	N	16.40	5.00	N	7.70	1	41400	26	15100
NS50	07-16-70	0825	005	2308	17.00	17.70	5.00	2.30	8.00	1	42200	27	15300
NS51	07-16-70	0845	005	2309	20.00	17.80	5.00	1.30J	8.00	1	41900	27	14700
NS52	07-16-70	0910	005	2310	20.00	17.10	4.10	1.30J	7.70	2	40900	26	14000
NS53	07-16-70	0930	005	2311	21.00	20.80	3.90	1.70J	7.60	3	24800	15	N
NS54	07-16-70	0945	005	2312	21.00	22.70	4.00	4.00	7.50	5	9700	5	3000
NS55	07-17-70	0745	005	2316	N	16.80	4.00	N	7.90	1	42000	26	15300
NS56	07-17-70	0725	005	2314	N	18.30	5.10	N	8.00	1	41200	26	15300
NS57	07-17-70	0710	005	2313	N	17.80	4.00	N	7.60	1	41500	26	14500
NS58	07-17-70	0735	005	2315	N	18.40	5.50	N	7.90	1	41800	26	15300
NS59	07-16-70	0905	005	2228	24.00	19.20	6.10	N	8.00	1	54800	26	15300
NS60	07-16-70	0920	005	2229	24.20	N	N	N	7.70	2	N	N	15300
NS61	07-16-70	0840	005	2227	21.00	19.20	5.90	N	8.20	1	40200	26	15500
NS62	07-16-70	1305	005	2306	30.50	21.40	3.50	3.10	7.60	5	36500	23	13500
NS63	07-16-70	1150	005	0515	N	23.00	2.50	6.80J	7.30	4	N	N	13300
NS64	07-16-70	1230	005	2305	26.00	21.50	2.00	2.10	7.50	6	33400	21	12300
NS65	07-16-70	1210	005	2304	26.50	26.50	1.40	1.90J	7.50	7	38400	24	14100
NS66	07-16-70	1255	005	2303	24.20	21.30	2.60	2.10	7.60	6	36100	23	13700
NS67	07-16-70	1130	005	2302	25.00	20.20	4.20	3.10	8.00	5	38700	25	14500
NS68	07-16-70	1020	005	2301	N	19.70	5.50	N	7.80	2	39700	26	15200
NS69	07-16-70	0950	005	2230	N	19.40	5.70	N	7.60	2	40100	25	16000
NS70	07-15-70	0745	005	2245	19.00	19.10	6.60	N	7.90	17	42300	27	15400
NS71	07-15-70	0730	005	2244	19.00	20.00	6.70	N	7.80	2	41700	27	15600
NS72	07-15-70	0810	005	2246	19.00	19.50	7.80	N	8.00	1	41900	27	15600
NS73	07-15-70	0840	005	2247	20.00	19.20	7.30	N	8.00	2	42300	27	15600
NS74	07-15-70	0900	005	2248	20.00	19.30	7.60	N	8.10	3	42500	27	16000
NS75	07-15-70	1015	005	2249	21.00	19.00	8.10	N	8.10	2	42500	27	16400
NS76	07-15-70	1240	005	2254	26.00	18.40	8.50	N	8.10	2	43600	28	16100
NS77	07-15-70	1225	005	2253	28.00	20.50	8.00	2.60	8.20	5	41400	27	15100
NS78	07-15-70	1155	005	2252	26.50	17.80	8.20	N	8.20	1	43600	28	16100
NS79	07-15-70	1140	005	2251	24.50	19.30	8.30	N	8.00	2	41800	27	14700
NS80	07-15-70	1115	005	2250	23.00	18.00	8.10	N	7.90	2	41900	27	16200
NS81	07-15-70	0930	005	2222	26.00	18.10	8.00	N	7.50	2	40500	26	15600
NS82	07-15-70	1045	005	2223	23.50	17.70	7.50	N	7.50	2	41900	27	16000
NS83	07-15-70	1000	005	2224	27.50	18.60	7.50	N	7.90	2	38700	25	15200
NS84	07-15-70	1025	005	2225	30.00	19.20	7.10	N	7.50	4	35300	22	10700
NS85	07-15-70	1045	005	2226	29.50	22.30	5.50	N	7.40	5	20400	12	7300
NS86	07-15-70	0955	005	2221	22.50	17.50	7.80	N	7.90	1	44100	27	16400
NS87	07-15-70	0805	005	2220	21.70	17.70	8.50	N	8.30	1	42600	27	16800
NS88	07-15-70	0845	005	2219	21.00	17.10	8.00	N	8.10	1	43300	28	16800
NS89	07-15-70	0700	005	2217	23.20	17.00	7.70	N	8.10	1	44600	28	16600
NS90	07-15-70	0720	005	2218	N	17.80	7.90	N	8.10	1	44700	28	16800
NS91	07-15-70	0645	005	2216	20.20	16.50	7.50	N	8.00	1	43800	28	16900
NS92	07-14-70	0805	005	2203	26.00	16.40	7.60	N	8.00	1	45200	28	17000
NS93	07-14-70	0845	005	2204	26.20	17.00	8.30	N	7.80	1	43300	28	17400
NS94	07-14-70	0915	005	2205	28.00	17.80	6.40	7.90L	7.60	2	42500	27	16200

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970 (Cont'd.)

STAT	DATE	TIME	DEPTH	LAB NO. 00008	CHLR- PHL A MG/M3 32230	NO3-N MG/L 00620	T KJL N MG/L 00625	PHS-T P-WET MG/L 00665	T ORG C MG/L 00680	CU UG/L 01040	CR UG/L 01030	ZINC UG/L 01090	LEAD UG/L 01049
NS46	07-17-70	1010	005	2338	11.70	0.04	0.72	0.11	5.00	120	100K	500K	300K
NS47	07-17-70	0950	005	2337	8.10	0.04	1.52	0.07	3.00	N	N	N	N
NS48	07-17-70	0940	005	2336	6.70	0.04	0.68	0.07	4.00	N	N	N	N
NS49	07-17-70	0805	005	2317	4.30	0.03	0.39	0.06	2.00	N	N	N	N
NS50	07-16-70	0825	005	2308	3.70	0.10	0.70	0.04	3.00	150	100K	90	300K
NS51	07-16-70	0845	005	2309	4.90	0.10	0.72	0.21	4.00	170	100K	80	300K
NS52	07-16-70	0910	005	2310	5.90	0.10	0.82	0.33	4.00	100K	100K	50K	300K
NS53	07-16-70	0930	005	2311	N	N	1.38	N	N	210	100K	130	300K
NS54	07-16-70	0945	005	2312	23.70	0.47	2.30	0.08	6.00	230	100K	120	300K
NS55	07-17-70	0745	005	2316	2.20	0.03	1.61	0.07	4.00	N	N	N	N
NS56	07-17-70	0725	005	2314	5.00	0.03	0.86	0.09	4.00	N	N	N	N
NS57	07-17-70	0710	005	2313	5.30	0.03	0.52	0.11	2.00	N	N	N	N
NS58	07-17-70	0735	005	2315	8.40	0.04	1.16	0.11	3.00	N	N	N	N
NS59	07-16-70	0905	005	2228	6.50	0.09	0.88	0.05	3.00	N	N	N	N
NS60	07-16-70	0920	005	2229	3.60	0.12	1.50	0.03	4.00	N	N	N	N
NS61	07-16-70	0840	005	2227	3.90	0.09	0.60	0.07	4.00	N	N	N	N
NS62	07-16-70	1305	005	2306	14.40	0.18	1.28	0.01	5.00	100K	100K	60	300K
NS63	07-16-70	1150	005	0515	14.10	0.32	1.60	0.07	5.00	100K	100K	60	300K
NS64	07-16-70	1230	005	2305	15.20	0.28	1.90	0.01	5.00	260	100K	60	300K
NS65	07-16-70	1210	005	2304	6.10	0.10	1.34	0.03	5.00	210	100K	120	300K
NS66	07-16-70	1255	005	2303	17.10	0.16	1.82	0.03	5.00	100K	100K	60	300K
NS67	07-16-70	1130	005	2302	8.80	0.14	1.36	0.02	5.00	100K	100K	50K	300K
NS68	07-16-70	1020	005	2301	4.10	0.10	0.94	0.03	3.00	N	N	N	N
NS69	07-16-70	0950	005	2230	3.50	0.10	0.42	0.03	4.00	N	N	N	N
NS70	07-15-70	0745	005	2245	2.00	0.06	0.70	0.05	2.00	N	N	N	N
NS71	07-15-70	0730	005	2244	5.90	0.07	0.65	0.08	3.00	100K	100	120	300K
NS72	07-15-70	0810	005	2246	2.80	0.07	0.56	0.07	2.00	N	N	N	N
NS73	07-15-70	0840	005	2247	3.70	0.07	0.60	0.07	5.00	N	N	N	N
NS74	07-15-70	0900	005	2248	7.10	0.06	0.96	0.07	3.00	N	N	N	N
NS75	07-15-70	1015	005	2249	3.30	0.06	0.70	0.04	2.00	N	N	N	N
NS76	07-15-70	1240	005	2254	5.20	0.06	1.14	0.04	3.00	N	N	N	N
NS77	07-15-70	1225	005	2253	6.30	0.08	N	0.05	3.00	100K	100K	60	300K
NS78	07-15-70	1155	005	2252	5.80	0.06	0.72	0.01K	6.00	N	N	N	N
NS79	07-15-70	1140	005	2251	5.50	0.06	1.20	0.04	2.00	N	N	N	N
NS80	07-15-70	1115	005	2250	4.60	0.06	0.92	0.04	2.00	N	N	N	N
NS81	07-15-70	0930	005	2222	5.70	0.06	1.06	0.05	2.00	N	N	N	N
NS82	07-15-70	1045	005	2223	6.10	0.06	0.70	0.04	3.00	N	N	N	N
NS83	07-15-70	1000	005	2224	4.20	0.06	0.58	0.04	2.00	N	N	N	N
NS84	07-15-70	1025	005	2225	5.30	0.12	0.86	0.32	4.00	N	N	N	N
NS85	07-15-70	1045	005	2226	9.10	0.19	1.48	0.12	5.00	100K	100K	50	300K
NS86	07-15-70	0955	005	2221	2.00	0.08	0.40	0.03	4.00	N	N	N	N
NS87	07-15-70	0805	005	2220	4.30	0.08	0.46	0.04	2.00	100K	100K	50K	300K
NS88	07-15-70	0845	005	2219	1.00	0.06	0.18	0.05	2.00	N	N	N	N
NS89	07-15-70	0700	005	2217	2.20	0.05K	0.58	0.03	2.00	N	N	N	N
NS90	07-15-70	0720	005	2218	1.10	0.06	0.64	0.05	3.00	100K	100K	50K	300K
NS91	07-15-70	0645	005	2216	2.80	0.05	0.94	0.04	3.00	N	N	N	N
NS92	07-14-70	0805	005	2203	N	0.05K	0.52	0.06	1.00	N	N	N	N
NS93	07-14-70	0845	005	2204	3.10	0.05K	0.64	0.06	2.00	N	N	N	N
NS94	07-14-70	0915	005	2205	6.30	0.10	1.20	0.07	5.00	100K	100K	100	300K

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970 (Cont'd.)

STAT	DATE	TIME	DEPTH	LAB NO. 00008	HG UG/L 71900	TCOLI MPN 100ML 31505	FCOLI MPN 100ML 31615
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NS46	07-17-70	1010	005	2338	N	1700	170
NS47	07-17-70	0950	005	2337	N	12	2
NS48	07-17-70	0940	005	2336	N	49	2
NS49	07-17-70	0805	005	2317	N	22	20
NS50	07-16-70	0825	005	2308	N	2	2K
NS51	07-16-70	0845	005	2309	2.00K	220	17
NS52	07-16-70	0910	005	2310	2.00K	3500	2400
NS53	07-16-70	0930	005	2311	2.00K	24000L	5400
NS54	07-16-70	0945	005	2312	2.00K	24000L	1700
NS55	07-17-70	0745	005	2316	N	11	70
NS56	07-17-70	0725	005	2314	N	170	33
NS57	07-17-70	0710	005	2313	N	79	11
NS58	07-17-70	0735	005	2315	N	23	50
NS59	07-16-70	0905	005	2228	N	80	50
NS60	07-16-70	0920	005	2229	N	23	8
NS61	07-16-70	0840	005	2227	N	220	17
NS62	07-16-70	1305	005	2306	4.00	24000L	5400
NS63	07-16-70	1150	005	0515	2.00K	9200	350
NS64	07-16-70	1230	005	2305	2.00K	13000	3300
NS65	07-16-70	1210	005	2304	N	5400	3500
NS66	07-16-70	1255	005	2303	N	16000	3500
NS67	07-16-70	1130	005	2302	N	3300	3300
NS68	07-16-70	1020	005	2301	N	170	17
NS69	07-16-70	0950	005	2230	N	280	49
NS70	07-15-70	0745	005	2245	N	13	8
NS71	07-15-70	0730	005	2244	N	33	13
NS72	07-15-70	0810	005	2246	N	11	5
NS73	07-15-70	0840	005	2247	N	2K	2K
NS74	07-15-70	0900	005	2248	N	11	2K
NS75	07-15-70	1015	005	2249	N	2K	2K
NS76	07-15-70	1240	005	2254	N	5	2K
NS77	07-15-70	1225	005	2253	N	110	70
NS78	07-15-70	1155	005	2252	N	7	2
NS79	07-15-70	1140	005	2251	N	79	33
NS80	07-15-70	1115	005	2250	N	21	7
NS81	07-15-70	0930	005	2222	N	33	5
NS82	07-15-70	1045	005	2223	N	13	5
NS83	07-15-70	1000	005	2224	N	130	17
NS84	07-15-70	1025	005	2225	N	70	22
NS85	07-15-70	1045	005	2226	N	79	33
NS86	07-15-70	0955	005	2221	N	2	2K
NS87	07-15-70	0805	005	2220	N	2	2K
NS88	07-15-70	0845	005	2219	N	13	5
NS89	07-15-70	0700	005	2217	N	17	7
NS90	07-15-70	0720	005	2218	N	33	11
NS91	07-15-70	0645	005	2216	N	33	33
NS92	07-14-70	0805	005	2203	N	79	49
NS93	07-14-70	0845	005	2204	N	33	33
N	07- 70	0	00	205		)	100

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970 (Cont'd.)

STAT	DATE	TIME	DEPTH	LAB NO. 00008	AIR TEMP CENT 00020	WATER TEMP CENT 00010	DO MG/L 00300	BOD 5 DAY MG/L 00310	PH SU 00400	TURB JKSN JU 00070	COND A-25C UMHOS 00095	SALIN G/L 70305	CL MG/L 00940
				-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NS95	07-14-70	0920	005	2206	25.60	17.90	7.00	2.70	7.90	3	40600	26	14700
NS97	07-14-70	0940	005	2207	26.60	17.60	7.20	2.90	8.00	2	40800	26	14700
NS98	07-14-70	0955	005	2208	26.50	19.70	6.60	2.50	8.00	3	33100	24	14100
NS99	07-14-70	1020	005	2209	25.90	20.30	5.10	4.10	7.40	5	35100	22	12300
NS100	07-14-70	1035	005	2210	26.70	23.60	4.20	4.30	7.30	5	35500	23	12700
NS101	07-14-70	1100	005	2211	30.10	20.20	7.00	3.30	7.50	4	32400	19	10100
NS102	07-14-70	1115	005	2212	28.60	20.60	8.60	7.30	7.40	4	30500	19	8300
NS103	07-14-70	1135	005	2213	27.20	21.70	7.00	3.70	7.20	5	25700	16	13700
NS104	07-14-70	1150	005	2214	27.50	23.10	5.40	3.20	7.10	4	N	1	3000
NS105	07-14-70	0735	005	2202	26.10	16.90	7.80	N	7.80	2	43900	28	16800
NS106	07-14-70	1240	005	2243	26.00	17.20	8.20	N	8.20	2	56200	37	16800
NS107	07-14-70	1215	005	2242	26.00	17.70	8.10	N	8.10	1	54200	37	16800
NS108	07-14-70	1155	005	2241	26.00	21.90	8.70	N	8.30	2	51900	34	16800
NS109	07-14-70	1140	005	2240	26.00	22.60	8.30	N	8.10	2	49900	32	16200
NS110	07-14-70	1125	005	2239	24.50	23.50	7.60	N	8.00	2	47800	31	15800
NS111	07-14-70	1005	005	2238	25.00	17.40	8.00	N	8.00	1	53200	35	17600
NS112	07-14-70	0945	005	2237	24.00	17.90	8.30	N	7.90	1	55000	36	17200
NS113	07-14-70	0925	005	2236	23.00	18.10	8.40	0.80J	7.90	1	48000	31	17600
NS114	07-14-70	0905	005	2235	22.00	20.70	7.90	2.20	8.10	1	47800	31	17600
NS115	07-14-70	0845	005	2234	22.00	20.30	8.10	1.20J	7.90	1	44400	20	15600
NS116	07-14-70	0830	005	2233	21.00	19.50	8.20	N	8.10	1	56100	37	17000
NS117	07-14-70	0815	005	2232	20.50	19.70	7.70	1.40J	7.70	1	56200	37	16800
NS118	07-14-70	0800	005	2231	20.00	20.70	6.10	1.80J	7.30	2	54400	36	15600

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970 (Cont'd.)

STAT	DATE	TIME	DEPTH	LAB NO. 00008	CHLR- PHL A MG/M3 32230	NO3-N MG/L 00620	T KJL N MG/L 00625	PHS-T P-WET MG/L 00665	T ORG C MG/L 00680	CU UG/L 01040	CR UG/L 01030	ZINC UG/L 01090	LEAD UG/L 01049
NS95	07-14-70	0920	005	2206	6.20	0.06	0.90	0.09	3.00	100K	100K	50K	300K
NS97	07-14-70	0940	005	2207	11.60	0.09	0.88	0.08	2.00	100K	100K	50	300K
NS98	07-14-70	0955	005	2208	12.10	0.09	0.94	8.00	2.00	100K	100K	50K	300K
NS99	07-14-70	1020	005	2209	21.60	0.10	1.54	0.08	4.00	100K	100K	50K	300K
NS100	07-14-70	1035	005	2210	34.30	0.12	1.10	0.10	4.00	100K	100K	50K	300K
NS101	07-14-70	1100	005	2211	15.80	0.15	1.28	0.12	5.00	100K	100K	50K	300K
NS102	07-14-70	1115	005	2212	88.80	0.18	1.20	0.13	4.00	100K	100K	50K	300K
NS103	07-14-70	1135	005	2213	20.00	0.12	0.86	0.15	2.00	100K	100K	50K	300K
NS104	07-14-70	1150	005	2214	N	0.44	1.90	0.17	5.00	100K	100K	50L	300K
NS105	07-14-70	0735	005	2202	2.40	0.05	0.70	0.06	N	N	N	N	N
NS106	07-14-70	1240	005	2243	3.90	0.05K	0.44	0.08	1.00	100K	100K	50K	300K
NS107	07-14-70	1215	005	2242	3.10	0.05K	0.50	0.08	2.00	N	N	N	N
NS108	07-14-70	1155	005	2241	3.80	0.06	0.96	0.09	2.00	N	N	N	N
NS109	07-14-70	1140	005	2240	7.60	0.09	0.70	0.11	2.00	100K	100K	50K	300K
NS110	07-14-70	1125	005	2239	8.70	0.08	0.92	0.17	2.00	100K	100K	50K	300K
NS111	07-14-70	1005	005	2238	3.80	0.05K	0.74	0.07	2.00	N	N	N	N
NS112	07-14-70	0945	005	2237	3.60	0.05K	0.40	0.07	4.00	N	N	N	N
NS113	07-14-70	0925	005	2236	2.70	0.05K	0.34	0.08	1.00	100K	100K	50K	300K
NS114	07-14-70	0905	005	2235	13.60	0.06	0.34	0.08	2.00	110L	100K	50K	300K
NS115	07-14-70	0845	005	2234	2.20	0.06	0.16	0.09	2.00	210L	100K	130	300K
NS116	07-14-70	0830	005	2233	1.60	0.05K	0.30	0.10	2.00	N	N	N	N
NS117	07-14-70	0815	005	2232	4.30	0.06	0.36	0.11	2.00	100K	100K	50K	300K
NS118	07-14-70	0800	005	2231	N	0.15	0.60	0.12	2.00	220L	100K	180L	300K

DATA, ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND, NORTH SHORE, JULY 1970 (Cont'd.)

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STAT       DATE    TIME DEPTH LAB         HG        TCOLI       FCOLI
                              NO.         UG/L      MPN         MPN
                                                    100ML       100ML
                              00008       71900     31505       31615
                              -----       -----     -----       -----
NS95   07-14-70 0920  005     2206            N       1600         920
NS97   07-14-70 0940  005     2207            N       1300         170
NS98   07-14-70 0955  005     2208            N        790         240
NS99   07-14-70 1020  005     2209            N     24000L      24000L
NS100  07-14-70 1035  005     2210            N       9200        2400
NS101  07-14-70 1100  005     2211            N       3500         940
NS102  07-14-70 1115  005     2212            N     24000L        1400
NS103  07-14-70 1135  005     2213            N     24000L        5400
NS104  07-14-70 1150  005     2214            N     24000L        9200
NS105  07-14-70 0735  005     2202            N         33          33
NS106  07-14-70 1240  005     2243            N          8           2
NS107  07-14-70 1215  005     2242            N         17           4
NS108  07-14-70 1155  005     2241            N         79          11
NS109  07-14-70 1140  005     2240            N        540         350
NS110  07-14-70 1125  005     2239            N        350         130
NS111  07-14-70 1005  005     2238            N          2          2K
NS112  07-14-70 0945  005     2237            N          2K         2K
NS113  07-14-70 0925  005     2236         2.50         33          13
NS114  07-14-70 0905  005     2235            N        110          17
NS115  07-14-70 0845  005     2234         2.00        540          79
NS115  07-14-70 0830  005     2233            N         70          23
NS117  07-14-70 0815  005     2232         5.00        540          79
NS118  07-14-70 0800  005     2231         5.50       9200        2400

REMARKS-
   N=NO DATA AVAILABLE.  J=ESTIMATED VALUE.  K=LESS THAN.  L=GREATER THAN.  -=MINUS TEMP
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